Origins of Sockeye Salmon in the Fisheries of Upper Cook Inlet, Alaska in 1986 Based on Scale Pattern Analysis

by

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State of Alaska   Steve Cowper, Governor

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ANALYSIS OF SCALE PATTERNS

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ABSTRACT

Multivariate linear discriminant models were developed for classifying age-1.3 sockeye salmon (*Oncorhynchus nerka*) harvested commercially in Upper Cook Inlet in 1986. Scale samples collected from fish entering the Susitna, Kenai, and Kasilof Rivers were used to build the discriminant models. The river of origin or stock composition of the remaining age classes were estimated based on the relative proportions of age-1.3 to other age classes in both the commercial harvests and escapements for a specific time period. The Crescent River sockeye salmon return was estimated by assigning the entire Central District West Side catch and an estimate of escapement to Crescent River.

The total return of 5,868,000 sockeye salmon was comprised of an estimated 837,000 Susitna River fish, 2,897,000 Kenai River fish, 1,945,000 Kasilof River fish, and 189,000 Crescent River fish. The commercial harvest was comprised of 642,000 Susitna River fish, 2,375,000 Kenai River fish, 1,627,000 Kasilof River fish, and 93,000 Crescent River fish. Exploitation rates for the Susitna, Kenai, Kasilof, and Crescent Rivers were 0.77, 0.82, 0.84, and 0.49, respectively.

INTRODUCTION

The Upper Cook Inlet management area is divided into two major fishing districts, the Central and Northern, which include all waters north of Anchor Point (Figure 1). For management purposes, the Central District is divided into a drift gill net fishery and seven set gill net fisheries: Chinitna Bay, West Side, West Forelands, Kalgin Island, Salamatof Beach, Kalifonsky Beach, and Cohoe/Ninilchik Beach. There are two set net fisheries within the Northern District: the East Side and West Side. The set net fisheries are generally limited to nearshore areas (within 5 miles on the west side of the inlet and 1½ miles on the east side). In contrast, the drift gill net fishery operates in the open waters of the Central District only.

Commercial fisheries in Upper Cook Inlet harvest mixed sockeye salmon stocks. Major salmon producing river systems are the Kenai River, Kasilof River, and Susitna River. Other rivers known to support sockeye salmon for which data are limited include: Crescent River, Fish Creek, McArthur River, Chakachatna River (major spawning tributary is the Chilligan River), Big River, Beluga River, Packers Creek and Cottonwood Creek.

Stock composition of the harvest in mixed stock fisheries is vital to fisheries management. This knowledge enables managers to more fully exploit surplus stocks while allowing adequate escapement of less abundant stocks. In addition the estimated commercial catch by river of origin is used for the evaluation of escapement goals, forecasting of future returns, and a variety of other biological studies.

Since 1978 scale pattern analysis has been used to estimate the component river systems of Upper Cook Inlet commercial catches of sockeye salmon (Bethe et al. 1980; Cross et al. 1981, 1982, 1983a, 1983b, 1985, 1986, 1987; Cross and Goshert *In press*). As a continuation of these studies, stock compositions of fish commercially harvested in 1986 were estimated with scale pattern analysis.

The objectives of these studies were to: (1) estimate stock compositions in Upper Cook Inlet sockeye salmon commercial harvests using scale pattern analysis of the major age class 1.3; (2) estimate stock compositions of other age classes by combining results from scale pattern analysis and escapement age composition; and (3) develop total return estimates by river for the Kenai, Kasilof, Susitna, and Crescent Rivers.

METHODS

Catch and Escapement

Commercial catch statistics were compiled by the Alaska Department of Fish and Game (ADF&G), Division of Commercial Fisheries from sales receipts (fish tickets). Catch figures presented in this report were taken from computer summaries dated 18 November 1986. Personal use dip net and sport harvests were estimated by the Division of Sport Fish (ADF&G) and documented by

Bendock (1986) and Nelson et al. (1986). Browning (ADF&G, Soldotna, personal communication) estimated the total number of fish harvested by the Kasilof River personal use gill net fishery.

Escapement of sockeye salmon to rivers in Upper Cook Inlet are estimated with various methods. Side-scanning sonar was used to count escapement of sockeye salmon into the Susitna River (Yentna Station), Kenai River, Kasilof River, and Crescent River (King and Tarbox *In press*). Escapements into Fish Creek (Chlupach, ADF&G, Big Lake, personal communication), Hidden Creek (Flagg 1986), Russian River (Nelson et al. 1986), and Packers Creek and Larson Creek (a tributary of Susitna River; Marcuson 1986a, 1986b) were enumerated with weirs.

Age, Sex, and Size Data

Ages of sockeye salmon were determined by examining scales for annual growth marks using criteria established by Mosher (1969). Ages were recorded in European notation. This aging method is designated by a numeral preceding the decimal which refers to the number of freshwater annuli, and a numeral following the decimal which refers to the number of marine annuli. Total age from the brood year is the sum of these two numbers plus one. Sex of fish was determined from morphological characteristics (i.e., upper jaw formation) as each fish was sampled. Fish length was measured from the middle of the eye to the fork of the tail and recorded in millimeters. Fish weight was recorded to one-tenth of a kilogram.

Scales were collected from the left side of the fish approximately two rows above the lateral line and on the diagonal row from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin (INPFC 1963). A sample goal of 680 fish was established for each fishery and time period sampled to provide a sufficient scale sample for age composition (to simultaneously estimate the true proportion of each major age class in the catch within five percentage points of the true percentage, 90% of the time) and stock composition analyses. Scales were mounted on gummed cards and impressions made in cellulose acetate using the methods of Clutter and Whitesel (1956).

Commercial Catch

All scale samples, sex, and size data for sockeye salmon in the commercial catches were collected by two crews consisting of two persons per crew. Age composition of catch by fishery and time period was estimated using a stratified systematic sampling design described by Cochran (1977).

Sockeye salmon were sampled from eight major fisheries: Northern District East Side set, Northern District West Side set, Central District West Side set, Kalgin Island set, Salamatof Beach set, Kalifonsky Beach set, Cohoe/Ninilchik Beach set and Central District drift gillnet fisheries. The Chinitna Bay and West Foreland set net fisheries were not sampled due to limited personnel and the relatively small contribution (0.04%) to the total commercial catch from these fisheries. The number of times a major fishery was sampled was originally designed to monitor the temporal change in age

composition. However, due to budget restrictions and corresponding reductions in sampling crews, a number of the fisheries incurred significant periods between sampling events. In these cases, an "imputed" value was used for missed sample periods. The imputed values were derived by using age composition estimates of the previously sampled period (in the absence of recent time series information) to characterize the unsampled period. In statistics, the term impute is used to describe a process by which a reasonable number is used for one that is missing (Geiger, ADF&G, Juneau, personal communication).

Personal Use and Sport Catch

Scales were not collected from sockeye salmon harvested by the personal use and sport fisheries. The age composition of the respective escapement was applied to these catches to estimate the harvest by age. However, it should be noted that gill net selectivity was assumed to be minimal. This may not have been the case and these data should be viewed accordingly.

Escapement

King and Tarbox (*In press*) reported the age compositions for escapements into the Susitna River (Yentna Station), Kenai River, Kasilof River, and Crescent River. Fish were captured with fish wheels at Yentna Station, the Kenai River and Kasilof River. A 3.2 m drift gillnet (mesh size 12.8 cm) was used to sample fish from Crescent River.

Age information was collected by FRED Division for Fish Creek (Chlupach, ADF&G, Big Lake, personal communication) and Hidden Creek (Flagg 1986). Scale samples from Packers Creek and Larson Creek were collected by Cook Inlet Aquaculture Association personnel (Marcuson 1986a, 1986b).

Catch Contribution

Linear discriminant analysis (Fisher 1936) of selected scale characteristics was used to estimate the stock composition of the 1986 Upper Cook Inlet age-1.3 sockeye salmon harvests. For each commercial fishery sampled, measurements from 100 scale samples of age-1.3 fish were used to estimate stock composition.

Scale Pattern Measurements

Scale impressions were projected at 100X magnification using equipment similar to that described by Ryan and Christie (1976). Scale measurements were recorded on computer diskettes from a Talos digitizing tablet connected to a COMPAQ DESKPRO microcomputer.

Linear measurements were taken along the anterior-posterior axis of each scale as defined in Clutter and Whitesel (1956). The distances between circuli were measured from the following scale growth zones: (1) scale focus to the outside edge of the first freshwater annulus (first freshwater zone), (2) outside edge of the freshwater annulus to the end of freshwater growth (freshwater plus growth zone), and (3) the end of freshwater plus growth zone

to the outer edge of the first ocean annulus (first marine zone). Also the total width of the second ocean annulus was recorded for age-1.3 samples (Figure 2). From the basic incremental distances and circuli counts, 109 scale variables were computed for age-1.3 samples (Table 1).

Discriminant Analysis

Escapement samples of 200 scales from age-1.3 sockeye salmon were used to build the standards for each river used in the linear discriminant functions (LDF).

Selection of scale characteristics for each discriminant model was made by a forward stepwise procedure using partial F statistics (in our case F= 4.0) as the criteria for entry/removal of variables (Enslein et al. 1977). Variables were added until the mean classification accuracy which is estimated from the diagonal terms of the classification matrix reached a maximum. A nearly unbiased estimate of classification accuracy for each LDF was determined using a leaving-one-out procedure (Lachenbruch 1967).

Age-1.3 Model Construction. A three-way linear discriminant model was constructed using age-1.3 scale characteristics representing fish from the Susitna River, Kenai River, and Kasilof River. Fish Creek and Packers Creek were not included in the age-1.3 analysis because the 1.3 age group represented small numbers of fish in their escapements, 18.3% (5,475 fish) and 3.6% (1,066 fish), respectively. In addition three two-way linear discriminant models were also constructed using age-1.3 scales representing Susitna-Kenai, Susitna-Kasilof and Kenai-Kasilof combinations. Crescent River was not included because the escapement enumeration project was terminated in response to emergency budget restrictions before a sufficient scale sample could be provided.

Classification models for the Susitna, Kenai, and Kasilof Rivers were constructed by weighting known scale samples through time based on daily escapement counts and fish wheel catches.

The known sample of scales used to represent Susitna River was comprised of scales from Yentna River (74%) and Larson Creek (26%) based on their relative contributions to the total monitored escapement and known differences in scale patterns. This approach was based on the assumption that scale characteristics of the combined Yentna River/Larson Creek samples were representative of the total Susitna River escapement.

In the linear discriminant analysis several assumptions are made (Moris 1975). The fishery is composed of k different stocks and each fish in the fishery has p different measurements on their scales. It is assumed that the p measurements are normally distributed, following a multivariate normal distribution. It is further assumed that there are only p distinct variances (one for each of the p measurements, regardless of stock) and there is a single variance-covariance matrix for the distribution of scale measurements (the same for each stock). In addition, each stock has a unique multivariate mean and that the multivariate means and the variance-covariance matrix from the escapement samples of k stocks can be estimated.

Several river systems (i.e., Big River, McArthur River, and Chakachatna River) that have been included in previous years' age-1.3 models were excluded due to reductions in the sampling budget in 1986.

Classification of Age-1.3 Commercial Catch Samples. Linear discriminant models were used to estimate stock compositions of mixed stock samples (age-1.3 scales from the commercial catches). Estimates of proportions contributed by each river system to the commercial catch samples were adjusted for misclassification errors with the procedure of Cook and Lord (1978). The variance and 90% confidence intervals for the adjusted estimates were computed using the procedures of Pella and Robertson (1979). A commercial catch sample was reclassified with a model representing fewer rivers if the adjusted proportion was less than or equal to zero for the river in question.

For fisheries that were sampled less frequently, contiguous fishing periods were combined and estimates of composition by river system for age-1.3 fish were imputed. The number of individual river system estimates developed for each fishery depended on the number of time strata sampled. In 1986 only two fisheries were sampled on any given day. In general, the drift fishery which typically harvests the largest number of fish, was sampled and analyzed the most intensely. A second fishery was sampled according to the stratified sampling design previously outlined. The number of sampling events or individual age-1.3 river system estimates by fishery were: 13 for the Central District drift, six for Cohoe/Ninilchik Beach, four for Kalifonsky Beach, three for Salamatof Beach, two for the Central District West Side, two for both the Northern District East Side and Northern District West Side, and one for Kalgin Island.

The numbers of age-1.3 sockeye salmon contributed by river system to a specific commercial catch were estimated from the product of the proportion of that stock in the catch, the proportion of the commercial catch of that age, and the number of fish caught:

$$\hat{C}_{i1.3} = C * \hat{P}_{1.3} * \hat{S}_{i1.3} \qquad (1)$$

Where:

C = Commercial catch of sockeye salmon in a fishery at a given time;

$\hat{C}_{i1.3}$ = Estimated age-1.3 sockeye salmon of river i origin in the commercial catch;

$\hat{P}_{1.3}$ = Estimated proportion of age-1.3 sockeye salmon in the commercial catch; and

$\hat{S}_{i1.3}$ = Estimated proportion of age-1.3 sockeye salmon of river i origin in the commercial catch.

The contributions by river system to each fishery were added to produce the total contribution by river system to the Upper Cook Inlet age-1.3 sockeye salmon harvest.

Catch Contribution of "Other" Age Classes

Since stock compositions of fish aged 1.3 were only estimated with linear discriminant analysis, stock compositions of all other age classes of fish were estimated based on the estimated age composition of the commercial catch and the escapement ratio of fish aged 1.3 to fish of other age classes in respective escapements:

$$\hat{S}_{ij} = \frac{\hat{S}_{i1.3}(\hat{A}_{ij}/\hat{A}_{i1.3})}{\sum\limits_{i=1}^{N} \hat{S}_{i1.3}(\hat{A}_{ij}/\hat{A}_{i1.3})} \qquad (2)$$

Where:

$\hat{S}_{ij}$ = Estimated proportion of commercial catch contributed by river i, age j fish;

$\hat{S}_{i1.3}$ = Estimated proportion of commercial catch contributed by river i, age-1.3 fish;

$\hat{A}_{ij}$ = Estimated proportion of escapement contributed by river i, age j fish;

$\hat{A}_{i1.3}$ = Estimated proportion of escapement contributed by river i, age-1.3 fish; and

N = Number of river systems.

The escapement ratios $(\hat{A}_{ij}/\hat{A}_{i1.3})$ by river system and age class are summarized in Appendix A.1.

The estimated number of sockeye salmon of river i and age j contributing to a commercial catch were then calculated using equation (1) but substituting:

$\hat{P}_j$ for $\hat{P}_{1.3}$ which is the estimated proportion of age j sockeye salmon in the commercial catch and

$\hat{S}_{ij}$ for $\hat{S}_{i1.3}$ which is the estimated proportion of age j sockeye salmon of river i origin in the commercial catch.

This method is based on the assumption that there is no differential exploitation of different age (size) fish and that there is no differential migratory timing of different age fish.

Total Return

The numbers of fish returning by age class to each river system were estimated by combining commercial catch, escapement and personal use harvests. Ratios of returns per spawner were calculated for the Susitna River, Kenai River, Kasilof River, and Crescent Rivers based on the available information. Return estimates and ratios of return per spawner for years prior to 1985 were taken from Cross et al. (1983b, 1985, 1986). The 1984 and 1985 total return estimates and return per spawner ratios for the Susitna River, Kenai River, Kasilof River, and Crescent River are provided in Cross et al. (1987) and Cross and Goshert (*In press*), respectively.

RESULTS AND DISCUSSION

Catch and Escapement

Commercial fishermen harvested 4,739,724 sockeye salmon in Upper Cook Inlet in 1986 (Table 2). Eight major fisheries that were monitored contributed 4,721,181 (99.6%) fish. A majority of the fish were harvested by the drift gill net fishery which caught 2,771,563 (58.4%) sockeye salmon. Set gill net fisheries along the east-side Central District beaches harvested 1,676,787 sockeye salmon which equaled 35.4% of the total catch. The Central District West Side set gill net fishery caught 74,836 sockeye salmon or 1.6% of the total harvest with Chinitna Bay and West Foreland fisheries contributing an additional 18,523 (0.4%) fish. Kalgin Island set gill net fishery contributed 60,943 (1.3%) fish to the total harvest. Northern District set gill net fisheries harvested 137,072 (2.9%) sockeye salmon.

Escapement into six monitored river systems equaled 1,127,411 sockeye salmon (Table 3). Estimates of total escapement are not available for several river systems in Upper Cook Inlet (i.e., Big River, and McArthur-Chakachatna Rivers) that have been monitored in the past. Escapement into these river systems in 1984 was estimated to be a minimum of 112,000 fish (King and Tarbox 1987). Therefore, the above figure represents a minimum escapement estimate to Upper Cook Inlet in 1986. The largest escapement of sockeye salmon occurred in the Kenai River (501,157 fish), followed by the Kasilof River (275,963 fish), Susitna River (194,887 fish), Crescent River (96,000 fish), Fish Creek (29,800 fish), and Packers Creek (29,604 fish).

Age Composition

Age-1.3 sockeye salmon dominated in the commercial catch (50.0%), while age-1.2, -2.3 and -2.2 fish comprised 24.4%, 13.4% and 10.8%, respectively (Table 4). Detailed commercial catch age compositions by fishery and date are presented in Appendices A.2 through A.9. In addition mean length and weight information by sex and age are presented in Appendices A.10 and A.11, respectively. Age-1.3 fish represented 58.8% of the total drift fishery catch with age-1.2 and 2.3 fish representing 17.8% and 13.7% of the harvest,

respectively. The Kalgin Island fishery was sampled only one time (Appendix A.6). The age composition for the Kalgin Island fishery was patterned after the drift fishery age composition, and age-1.3, -1.2 and -2.3 fish comprised 61.6%, 12.8% and 16.4%, respectively (Table 4). In addition age-2.2 fish comprised 7.6% of the total catch in the Kalgin Island fishery. Age classes which were predominant in Central District East Side beach fisheries were 1.2 and 1.3. Age-1.3 sockeye salmon were more dominant in the Salamatof Beach fishery (53.7%) than in the Kalifonsky Beach fishery (33.5%) and Cohoe/Ninilchik Beach fisheries (32.2%; Table 4). The percentage of age-1.2 fish was much lower in the Salamatof Beach fishery (15.0%) than in the Kalifonsky Beach fishery (39.9%) and Cohoe/Ninilchik Beach fisheries (41.0%). The Central District West Side fishery was represented by age-2.3, -1.3 and-2.2 fish which contributed to 48.8%, 22.8% and 19.1% of the total catch, respectively. The Northern District East Side and West Side fisheries differed in age composition. In the east-side fishery age-1.3, -1.2 and -2.2 sockeye salmon represented 32.0%, 40.3% and 15.0%, respectively. In contrast, the west-side fishery age-1.3, 1.2 and 2.2 fish comprised 65.0%, 12.2% and 5.0%, respectively.

Age class contributions of sockeye salmon returning to Upper Cook Inlet varied considerably among river systems (Table 5). Escapement into the Susitna River was primarily composed of fish aged 1.3 (61.5%), 1.2 (21.9%), and 2.3 (7.8%). Age classes comprising significant percentages of the escapement in the Kenai River included: 1.3 (39.5%), 1.2 (31.8%), 2.3 (18.0%), and 2.2 (8.2%). Fish aged 1.2 and 1.3 comprised, respectively, 40.9% and 42.0% in the Kasilof River, followed by age-2.2 representing 11.9% of the fish. Escapement into Crescent River was not monitored sufficiently to provide a weighted age composition. Age composition for the 139 fish sampled in Crescent River is provided in Table 5. Fish Creek age-1.2 sockeye salmon represented 54.2% of the escapement followed by age-1.3 (18.4%), age-1.1 (12.9%) and age-2.2 (10.2%). Packers Creek escapement was comprised mainly of age-2.2 (44.9%) and age-2.3 (30.8%) fish.

Classification Models of Age-1.3

A summary of the mean and standard error values for the measured and/or counted scale variables and combinations of variables is presented in Table 6. From these variables, the stepwise regression selected the variables that were incorporated into the model as shown in Table 7. In the age-1.3 analysis, a total of 49 variables which includes 21 variables in the first freshwater annulus zone, 2 variables in the plus growth zone, 2 variables in the freshwater and plus growth zone, 23 variables in the first marine annulus zone, and one variable in the second marine annulus zone were among those variables selected for use in the model analysis. First freshwater growth (S1FW) was the greatest for Kenai River fish followed by Susitna River and Kasilof River fish. Plus growth was greatest for the Kasilof River followed by Susitna River and Kenai River fish. In the combined freshwater and plus growth, a trend similar to the first freshwater growth was observed. The first marine growth was greatest for Kenai River fish followed by Kasilof River and Susitna River fish. Second marine growth followed the same trend as first marine growth.

The scale characteristics which have the greatest separation in mean values and provide the greatest discrimination among river systems for age-1.3 fish are represented in the models incorporating Susitna River, Kenai River and Kasilof River (Table 7). In the freshwater zones (freshwater and plus growth), seven variables (2, 7, 15, 16, 17, 61, and 66) were selected. From the marine zones, nine variables (70, 72, 82, 86, 90, 104, 105, 107, and 109) were chosen. Plots of two scale characteristics (105 and 109) representing the Susitna River, Kenai River and Kasilof River are shown in Figures 3 and 4. These distributions reasonably approximate normal distributions, without obvious asymmetry or outliers (nonstatistical comparison = NSC).

A three-way model including Susitna River, Kenai River and Kasilof River age-1.3 sockeye salmon was developed (Table 7). The overall classification accuracy was 0.617. The individual river classification accuracies for Susitna River, Kenai River and Kasilof River were 0.515, 0.680 and 0.655, respectively. Three two-way models were also developed (Table 7). The overall classification accuracies for the Susitna-Kasilof, Susitna-Kenai and Kenai-Kasilof models were 0.732, 0.765 and 0.788, respectively.

Commercial Catch Contribution of Age-1.3

Stock composition point estimates and 90% confidence intervals of age-1.3 sockeye salmon are presented in Table 8. Catches of age-1.3 fish in the Central District drift fishery were comprised of increasing proportions of Kenai River and Susitna River fish and conversely decreasing proportions of Kasilof River fish from 27 June to 30 July 1986 (Figure 5). Peak stock proportions of Susitna River, Kenai River and Kasilof River occurred on 28 July (0.371), 30 July (0.731) and 27 June (1.000), respectively. In the Cohoe/Ninilchik Beach fishery, Kenai River stock proportions increased from 0.113 on 4 July to 0.450 on 22 July (Figure 6). Peak contribution for the Kenai River stock occurred on 22 July on Cohoe/Ninilchik Beach. Susitna River stock composition proportions increased from a "trace" on 4 July to 0.416 on 17 July with a subsequent decrease to 0.202 on 22 July. Kasilof River stock proportions of age-1.3 fish were at a high of 0.887 on 4 July and eventually decreased to an average of 0.351 for the period 14 July to 22 July. Kalifonsky Beach, during the period 4 July to 28 July, showed a decrease in Susitna River stock proportions from 0.306 to 0.064, an increase in Kenai River stock proportions from 0.212 to 0.674, and a reduction in Kasilof River stock proportions from 0.482 on 4 July to 0.200 on 18 July (Figure 6). Stock composition of Salamatof Beach on 11 July showed that Susitna River, Kenai River and Kasilof River stock proportions were 0.578, 0.237 and 0.184, respectively. However, there were only 156 fish harvested. By 26 and 30 July, fish that were caught on Salamatof Beach were essentially all bound for the Kenai River (stock proportion range 1.000 to 0.948).

A scale sample sufficient for incorporating Crescent River in the discriminant analysis was not available. Therefore, the Central District West Side commercial catch was assumed to be of Crescent River origin based on the close geographical proximity of the fishery to Crescent River. Unfortunately, this inflates the true contributions of Crescent River fish in the West Side commercial catch knowing that other stocks (Susitna River and

Fish Creek) have contributed as much as 20% to the overall harvest in 1985 (Cross and Goshert *In press*).

Stock composition in the Kalgin Island fishery was available for 30 June only (Table 8). Susitna, Kenai, and Kasilof Rivers contributed 0.177, 0.192, and 0.631 to the commercial catch, respectively.

Northern District East Side harvest was comprised of Susitna River and Kenai River stocks. Stock proportions for Susitna and Kenai Rivers on 25 July were 0.887 and 0.113, respectively (Table 8).

Stock contribution estimates were made on 21 and 25 July in the Northern District West Side commercial catch (Table 8). Stock estimates for the Susitna River ranged from 100% on 21 July to 47% on 25 July. Stock estimates for the Kenai and Kasilof Rivers ranged from a "trace" on 21 July to 21% and 33%, respectively on 25 July. Based on the geographical proximity of the fishery to the Susitna River and the time of the season, the estimates of stock contribution on 21 July would probably reflect more accurately the stocks being harvested in this location. However, other stocks (i.e., McArthur/Chakachatna Rivers) have been present historically in this area and those fish classified to Kenai River and Kasilof River could be from "other" systems not included in the model.

Estimated and imputed total river system age-1.3 contributions by fishery are presented in Table 9. The total Upper Cook Inlet harvest of age-1.3 sockeye salmon was 2,364,825. Susitna, Kenai, Kasilof and Crescent Rivers contributed 0.183, 0.478, 0.330, and 0.007 to the total age-1.3 harvest, respectively. In the Central District drift and Kalgin Island fisheries, Kenai River fish predominated at 0.467 and 0.558, respectively. Stock contribution trends in the Central District East Side beach fisheries revealed that the proportion of Kenai River fish increased from Cohoe/Ninilchik Beach (0.370) to Salamatof Beach (0.948). Conversely, Susitna River and Kasilof River stocks decreased in proportion from Cohoe/Ninilchik Beach to Salamatof Beach. Susitna River and Kenai River contributed 0.887 and 0.113, respectively, to the Northern District East Side catch.

Commercial Catch Contribution of All Age Classes

Stock contributions of all age classes by river system to the 1986 Upper Cook Inlet sockeye salmon harvest are presented in Table 10. The Kenai River represented 50.1% of the commercial catch followed by Kasilof River (34.3%), Susitna River (13.5%), Crescent River (1.6%), and unknown (0.4% age classes represented in commercial catches but not in monitored escapements). The unknown percentage also includes commercial catches from Chinitna Bay and West Forelands fisheries which were not sampled. The majority of fish harvested were from the Kenai, Kasilof and Susitna Rivers and were ages 1.3 and 1.2. In comparison, the majority of fish of Crescent River origin were ages 2.3 and 1.3. Age-1.3 fish predominated in the harvests of Northern District West Side, Central District drift, Kalgin Island, and Salamatof Beach fisheries. Age-1.2 fish predominated in the catches of Northern District East Side, Kalifonsky Beach, and Cohoe/Ninilchik Beach fisheries. Age-2.3 fish predominated only in the Central District West Side commercial

catch. Other age classes that contributed to the commercial harvest of sockeye salmon in descending order of importance included ages 2.2, 0.3, 1.4, 0.2, 1.1, and 0.4. Detailed stock composition estimates by age class, fishery, and date for individual fisheries are reported in Appendices B.1 through B.6.

The commercial harvest of sockeye salmon by fishery and river system is summarized in Table 11. Fisheries represented in decreasing order of importance are as follows: Central District drift (58.5%), Cohoe/Ninilchik Beach (19.6%), Kalifonsky Beach (10.4%), Salamatof Beach (5.4%), Northern District West Side (2.0%), Central District West Side (1.6%), Kalgin Island (1.3%), Northern District East Side (0.9%), and West Foreland/Chinitna Bay (0.4%). Sockeye salmon bound for the Susitna River were harvested predominately by the Central District drift (52.3%) followed by Cohoe/Ninilchik Beach (21.6%), and Northern District West Side (14.4%) fisheries. Kenai River and Kasilof River sockeye salmon were harvested predominately by the Central District drift (60.1% and 61.8%, respectively) followed by Cohoe/Ninilchik Beach (16.0% and 25.1%, respectively), and Kalifonsky Beach (11.6% and 11.6%, respectively) fisheries.

Description of River System Returns

An estimated 5,868,592 sockeye salmon returned to the Susitna, Kenai, Kasilof, and Crescent Rivers of Upper Cook Inlet in 1986 (Table 12). Estimates of total return of sockeye salmon by river system were as follows: Susitna River (836,698 fish), Kenai River (2,897,156 fish), Kasilof River (1,945,379 fish), and Crescent River (189,359 fish).

Estimates of the commercial harvest of sockeye salmon for the Susitna River (641,811 fish), Kenai River (2,374,829 fish), Kasilof River (1,627,483 fish), and Crescent River (93,359 fish) represented 4,737,482 fish (Table 12). The rate of exploitation by the commercial fishery in 1986 was highest for fish returning to Kasilof River (0.84) and lowest for fish returning to Crescent River (0.49). The exploitation rates for Susitna River and Kenai River were 0.77 and 0.82, respectively.

Personal use and sport catches of 63,103 sockeye salmon for the Kenai River sport fishery and Kasilof River dip net and gill net fisheries represented 21,170, 32,324 and 9,609 fish, respectively (Table 12).

Summaries of commercial catch contributions and return per spawner information by river system for the period 1978 through 1984 are presented in Cross et al. (1987) and for 1985 found in Cross and Goshert (*In press*).

Age and stock composition estimates of the 1986 sockeye salmon return provides estimates for age class 2.3 from the 1980 brood year, age classes 1.3 and 2.2 from the 1981 brood year, and age class 1.2 from the 1982 brood year. These estimates were added to the return per spawner tables reported in Cross et al. (1987) and Cross and Goshert (*In press*) and are summarized in Tables 13 through 16.

Assumptions and Bias in the River System Returns

The 1986 stock composition results for the Susitna River, Kenai River, Kasilof River, and Crescent River systems should be viewed with some discretion for several reasons. It was necessary to make assumptions regarding temporal age composition in several commercial fisheries where no information was available. In addition escapement samples were lacking from Crescent River, Big River, McArthur River, Chakachatna River and Fish Creek which reduced the number of sockeye salmon stocks included in the stock model analysis. Consequently, only three river systems (Susitna, Kenai, Kasilof) were utilized in the discriminant analysis of all the commercial catches except for the Central District West Side and Northern District West Side commercial catches which were assumed to be of Crescent River and Susitna River origin, respectively.

In the discriminant analysis several assumptions are made concerning the data (normality) and treatment of the data (test of variance/covariance matrices) in generating the stock model. If these assumptions are violated, this will affect the precision in classifying a given commercial catch sample correctly and concurrently affect the misclassification matrix. Also, in the classification matrix, the mean classification accuracies were all less than 80% with individual system classification accuracies ranging from 51% (Susitna River) to 68% (Kenai River) in the 3- way model, and ranged from 70% (Susitna River) to 80% (Kasilof River) in the 2-way models. Consequently, potential errors in defining stock composition within a fishery may exist.

An assumption which would cause bias in the development of stock models is that the scale samples are not representative (i.e., assuming that Yentna River and Larson Creek do not represent the Susitna drainage). This assumption relates to any "known" scale sample used to build the stock models. Also, the entire classification of other age classes is based on the age-1.3 stock analysis which implies that there were no differences in exploitation rates among all age classes. However, observed differences in timing and migratory behavior of specific stocks returning to Upper Cook Inlet indicates there is a potential for bias in the other age class contributions by river system.

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TABLES AND FIGURES

Table 1. Scale variables screened for linear discriminant function analysis of age-1.3 sockeye salmon, Upper Cook Inlet, Alaska, 1986.

Variable Number	Variable Name	Scale Zone
		First Freshwater Annulus
1	NC1FW	Number of circuli first freshwater
2	S1FW	Size (width) of first freshwater
3 (16)	C0-C2	Distance, scale focus (C0) to circulus 2 (C2)
4 (17)	C0-C4	Distance, scale focus to circulus 4
5 (18)	C0-C6	Distance, scale focus to circulus 6
6 (19)	C0-C8	Distance, scale focus to circulus 8
7 (20)	C2-C4	Distance, circulus 2 to circulus 4
8 (21)	C2-C6	Distance, circulus 2 to circulus 6
9 (22)	C2-C8	Distance, circulus 2 to circulus 8
10 (23)	C4-C6	Distance, circulus 4 to circulus 6
11 (24)	C4-C8	Distance, circulus 4 to circulus 8
12 (25)	C(NC-4)-E1FW	Distance, circulus (number circuli first freshwater minus 4) to end first freshwater
13 (26)	C(NC-2)-E1FW	Distance, circulus (number circuli first freshwater minus 2) to end first freshwater
14	C2-E1FW	Distance, circulus 2 to end first freshwater
15	C4-E1FW	Distance, circulus 4 to end first freshwater
16 thru 26	C0-C2/S1FW ... C(NC-2)-E1FW/S1FW	Relative widths, (variables 3-13)/S1FW
27	S1FW/NC1FW	Average interval between circuli in first freshwater
28	NC 1ST 3/4	Number of circuli in first 3/4 of first freshwater

- Continued -

Table 1. (p 2 of 4)

Variable Number	Variable Name	Scale Zone
29	MAX DIST	Maximum distance between 2 consecutive circuli in first freshwater
30	MAX DIST/S1FW	Relative width, (variable 29)/S1FW

Plus Growth

61	NCPG	Number of circuli in plus growth
62	SPGZ	Size (width) plus growth zone

Freshwater and Plus Growth

65	NC1FW + NCPG	Total number of circuli first freshwater and plus growth
66	S1FW + SPGZ	Total size (width) first freshwater and plus growth
67	S1FW/S1FW + SPGZ	Relative width, (variable 2)/S1FW + SPGZ

First Marine Annulus

70	NC1OZ	Number of circuli in first ocean zone
71	S1OZ	Size (width) first ocean zone

- Continued -

Table 1. (p 3 of 4)

Variable Number	Variable Name	Scale Zone
72 (90)	EFW-C3	Distance, end of freshwater growth to circulus 3
73 (91)	EFW-C6	Distance, end of freshwater growth to circulus 6
74 (92)	EFW-C9	Distance, end of freshwater growth to circulus 9
75 (93)	EFW-C12	Distance, end of freshwater growth to circulus 12
76 (94)	EFW-C15	Distance, end of freshwater growth to circulus 15
77 (95)	C3-C6	Distance, circulus 3 to circulus 6
78 (96)	C3-C9	Distance, circulus 3 to circulus 9
79 (97)	C3-C12	Distance, circulus 3 to circulus 12
80 (98)	C3-C15	Distance, circulus 3 to circulus 15
81 (99)	C6-C9	Distance, circulus 6 to circulus 9
82 (100)	C6-C12	Distance, circulus 6 to circulus 12
83 (101)	C6-C15	Distance, circulus 6 to circulus 15
84 (102)	C9-C15	Distance, circulus 9 to circulus 15
85 (103)	C(NC-6)-E1OZ	Distance, circulus (number circuli first ocean minus 6) to end first ocean
86 (104)	C(NC-3)-E13OZ	Distance, circulus (number circuli first ocean minus 3) to end first ocean
87	C3-E1OZ	Distance, circulus 3 to end of first ocean
88	C9-E1OZ	Distance, circulus 9 to end of first ocean
89	C15-E1OZ	Distance, circulus 15 to end of first ocean
90 thru 104	EFW-C3/S1OZ ... C(NC-3)-E13OZ/S1OZ	Relative widths, (variables 72-86)/S1OZ
105	S1OZ/NC1OZ	Average interval between circuli in first ocean
106	NC 1ST 1/2	Number of circuli in first 1/2 of first ocean
107	MAX DIST	Maximum distance between 2 consecutive circuli in first ocean
108	MAX DIST/S1OZ	Relative width, (variable 107)/S1OZ

- Continued -

Table 1. (p 4 of 4)

Variable Number	Variable Name	Scale Zone
		Second Marine Annulus
109	S2OZ	Size (width) of second ocean zone

Table 2. Sockeye salmon commercial harvest in numbers of fish by fishery and date, Upper Cook Inlet, 1986.

	Northern District		Central District								
Date	East Side	West Side	Drift	West Side	Chinitna Bay	Kalgin Island	West Foreland	Salamatof Beach	Kalifonsky Beach	Cohoe/Ninilchik Beach	Total[a]
6/02	60	50									110
6/09	454	289									743
6/16	363	306		440		29					1,138
6/20				413							413
6/23				871							871
6/27	308	168	23,564	2,755	691	4,027	232				31,745
6/30	262	68	41,079	2,972	347	3,956	428				49,112
7/03									4,111	19,601	23,712
7/04	662	307	142,915	3,850	353	1,119	279	749	1,774	11,586	163,594
7/07	306	69	216,191	2,401	1,104	780	495	63	876	22,444	244,729
7/11	530	99	369,198	2,156	665	453	3,153	156	2,080	29,277	407,767
7/13									30,029	60,055	90,084
7/14	8,182	5,492	378,712	6,096	1,051	1,399	477	8,986	30,971	110,247	551,613
7/15			79,633						9,087	23,050	111,770
7/17									23,757	52,028	75,785
7/18	520	617	500,788	6,359	197	6,108	112	1,683	49,794	49,133	615,311
7/19			103,452						28,502	101,183	233,137
7/20			25,247						29,376	57,649	112,272
7/21	8,677	18,233	329,923	9,607	203	4,994	1,241	78,443	81,178	57,293	589,792
7/22									19,821	39,164	58,985

- Continued -

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Table 2. (p 2 of 3)

Date	Northern District		Central District								
	East Side	West Side	Drift	West Side	Chinitna Bay	Kalgin Island	West Foreland	Salamatof Beach	Kalifonsky Beach	Cohoe/Ninilchik Beach	Total[a]
7/23				5,406							
7/25	12,617	34,253		8,596	25	5,004	2,180		18,598	24,311	5,406
7/26			187,992			2,471	1,695	62,817	53,461	122,823	105,584
7/27											431,259
7/28	2,815	10,636	166,327	7,048	41	3,786	1,005	8,995	14,509	24,913	48,417
7/30	4,160	12,137	91,558	4,244		3,095	329	9,144	7,966	14,712	223,480
7/31			10,541					22,581	19,790	17,780	175,674
8/01	1,829	6,750	26,200	2,928	31	3,093	340	12,551	12,946	16,972	53,010
8/02			8,524			97		15,891	13,302	15,130	85,494
8/03			7,506			417		4,018	5,338	16,251	34,228
8/04	219	944	32,082	3,643	13	5,744	191	3,522	5,255	8,849	25,549
8/06	890	1,296	21,793	2,782		3,328	606	4,167	8,894	10,328	66,225
8/08	163	255	448	325	4	1,419	154	11,352	7,476	6,926	56,449
8/09			2,131					3,174	4,278	3,373	13,593
8/10			1,074					3,510	3,785	3,472	12,898
8/11	155	268	4,106	1,050	1	3,132	248	1,857	2,946	3,256	9,133
8/15	346	294	419	452	11	2,726	104	1,087	1,925	3,901	15,873
8/18	489	105	133	167	348	1,490	18	2,173	861	1,475	8,861
8/22	242	28	18	172	113	1,063	16				2,750
											1,652

- Continued -

Table 2. (p 3 of 3)

	Northern District		Central District								
Date	East Side	West Side	Drift	West Side	Chinitna Bay	Kalgin Island	West Foreland	Salamatof Beach	Kalifonsky Beach	Cohoe/Ninilchik Beach	Total[a]
8/25	59	7		62	9	603	3				743
8/29	51	13	7	22	4	369	1				467
9/01	18	3	2	19	2	130					174
9/05	7	1			2	91					101
9/08					1	20					
Total	44,384	92,688	2,771,563	74,836	5,216	60,943	13,307	256,919	492,686	927,182	4,739,724

a Commercial harvest figures taken from Alaska Department of Fish and Game postseason harvest compilation dated 18 November, 1986.

Table 3. Escapement of sockeye salmon in Upper Cook Inlet, 1986.

River System	Numbers	Method
Susitna River:	194,887[a]	
Yentna Station	92,077[a]	sonar
Larson Creek	32,322[b]	weir
Kenai River:	501,157[a]	sonar
Russian River	55,652[c]	weir
Hidden Creek	17,530[d]	weir
Kasilof River:	275,963[a]	sonar
Crescent River:	96,000[a]	sonar
Fish Creek:	29,800[e]	weir
Packers Creek:	29,604[f]	weir
Total	1,127,411	

[a] Source: King, B. and K. Tarbox. In press. Upper Cook Inlet salmon (*Oncorhynchus* spp.) escapement studies, 1986. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report, Juneau.

[b] Source: Marcuson, P. 1986. Larson Lake project. Technical Progress Report. Cook Inlet Aquaculture Association. Soldotna, Alaska.

[c] Source: Nelson, D.C., Athons, D.E. and Carlon, J.A. 1986. Russian River sockeye salmon study. Alaska Department of Fish and Game, Division of Sport Fish, Federal Aid in Fish Restoratio Annual Performance Report, 1985-1986, Project AFS-44, 26(AFS-44-1-59.

[d] Source: Flagg, L. 1986. 1986 Annual Report. Alaska Departmen of Fish and Game, Division of Fisheries Rehabilitation, Enhancem and Development, Soldotna, Alaska.

[e] Source: Chlupach, R. Alaska Department of Fish and Game, Big La personal communication.

[f] Source: Marcuson, P. 1986. Packers Lake project. Technical Progress Report. Cook Inlet Aquaculture Association. Soldotna, Alaska.

Table 4. Age composition of the commercial sockeye salmon harvest by brood year, age class and fishery, Upper Cook Inlet, 1986.

| | | Brood Year and Age Class[a] | | | | | | | | | | | | | |
| | | 1983 | | 1982 | | | 1981 | | | 1980 | | | 1979 | | |
Fishery		0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4	Other	Total
Northern East Side	Percent		0.9	1.0	40.3	0.5		32.0	15.0		9.4	0.9			100.0
	Numbers		400	444	17,887	221		14,202	6,658		4,172	400			44,384
	Standard Error		49	52	256	37		244	186		152	49			
	Sample Size 585														
Northern West Side	Percent	0.1	0.0[b]	2.1	12.2	0.1	0.1	65.0	5.0	0.6	14.6	0.1	0.1		100.0
	Numbers	100	40	1,921	11,354	62	133	60,209	4,591	577	13,506	62	133		92,688
	Standard Error	53	34	219	520	41	67	791	356	101	602	41	67		
	Sample Size 1,111														
Central District Drift	Percent	0.1		1.1	17.8			58.8	8.3	0.2	13.7	0.0[b]	0.0[b]	0.0[b]	100.0
	Numbers	333		29,351	492,104			1,630,459	230,986	6,234	380,655	757	525	159	2,771,563
	Standard Error	301		3,726	13,869			17,824	10,109	1,375	12,391	703	316	141	
	Sample Size 7,918														
Central District West Side	Percent			0.5	7.6	0.4		22.8	19.1	0.0[b]	48.8	0.8			100.0
	Numbers			383	5,691	306		17,042	14,285	30	36,488	611			74,836
	Standard Error			26	83	11		131	120	8	151	15			
	Sample Size 964														

Continued -

Table 4. (p 2 of 3)

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| | | Brood Year and Age Class[a] | | | | | | | | | | | | | | |
| | | 1983 | | 1982 | | | 1981 | | | 1980 | | | 1979 | | | |
Fishery		0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4	Other	Total
Kalgin Island	Percent			1.3	12.8			61.6	7.6		16.4		0.1	0.0[b]	99.8
	Numbers			770	7,813			37,557	4,657		9,981		34	131	60,943
	Standard Error Sample Size 264			25	81			117	80		73		15	0	
West Foreland/ Chinitna Bay	Percent[c]			0.5	7.6	0.4		22.8	19.1		48.8	0.8			100.0
	Numbers			93	1,407	74		4,223	3,538		9,039	149			18,523
Salamatof Beach	Percent	0.1		1.5	15.0			53.7	8.0	0.4	21.3				100.0
	Numbers	325		3,914	38,625			137,789	20,627	1,095	54,544				256,919
	Standard Errors Sample Size 1,228	113		380	920			1,336	711	185	1,102				

- Continued -

Table 4. (p 3 of 3)

Fishery		1983 0.2	1983 1.1	1982 0.3	1982 1.2	1982 2.1	1981 0.4	1981 1.3	1981 2.2	1980 1.4	1980 2.3	1980 3.2	1979 2.4	Other	Total
Kalifonsky	Percent	0.0[b]		0.3	39.9			33.5	14.9	0.3	11.0		0.1		100.0
Beach	Numbers	127		1,571	196,405			164,985	73,483	1,578	54,223		314		492,686
	Standard Error	4		93	991			987	686	21	649		6		
	Sample Size 2,362														
Cohoe/															
Ninilchik	Percent	0.0[b]		0.4	41.0	0.0[b]	0.0[b]	32.2	16.7	0.7	8.7	0.1	0.2		100.0
Beach	Numbers	62		3,530	380,673	177	224	298,359	154,560	6,460	80,893	667	1,577		927,182
	Standard Error	22		329	2,896	105	43	2,666	2,189	724	1,601	70	269		
	Sample Size 3,586														
Total[d]	Percent	0.0[b]	0.0[b]	0.9	24.4	0.0[b]	0.0[b]	50.0	10.8	0.3	13.4	0.1	0.1	0.0	100.0
	Numbers	947	440	41,977	1,151,959	840	357	2,364,825	513,385	15,974	643,501	2,646	2,583	290	4,739,724
	Standard Error	460	60	3,768	14,245		80	18,118	10,399	1,568	12,576	710	421	0	

(Header spanning: Brood Year and Age Class[a])

[a] Age information summarized from original age-weight-length data forms. Harvest numbers taken from Alaska Department of Fish and Game postseason harvest compilation dated 18 November, 1986. Age composition information compiled from Appendices A.2 through A.9.
[b] Fish present, but represent less than 0.05% of the catch.
[c] Age composition assumed to be the same as Central District west-side set gill net fishery.
[d] The values in this table include estimated and imputed quantities.

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Table 5. Age composition of sockeye salmon escapements by brood year, age class and river system, Upper Cook Inlet, 1986.

| | | | Brood Year and Age Class | | | | | | | | | | | | | |
| | | | 1983 | | 1982 | | | 1981 | | | 1980 | | | 1979 | | |
River System	Sample Size		0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	3.3	2.4	Total
Susitna River:																
Yentna Station[a]	688	Numbers	1,644		1,817	19,639	519		48,967	5,104	173	8,652				86,515
		Percent	1.9		2.1	22.7	0.6		56.6	5.9	0.2	10.0				100.0
Larson Creek[b]	1,138	Numbers	17			6,365			24,129	1,123	17	672				32,323
		Percent	0.1			19.7			74.6	3.5	0.1	2.1				100.0
Total[c]	1,826	Numbers	2,724		2,979	42,645	851		119,874	10,213	312	15,290				194,887
		Percent	1.4		1.5	21.9	0.4		61.5	5.2	0.2	7.8				100.0
Kenai River:																
Russian River[d]	454	Numbers				7,640			25,345	2,466	81	4,851				40,422
		Percent				18.9			62.7	6.1	0.2	12.0				100.0
Hidden Creek[e]	171	Numbers				14,936			1,560	912		123				17,530
		Percent				85.2			8.9	5.2		0.7				100.0
Total[a]	789	Numbers	501		6,515	159,368	1,503		197,957	41,095	3,508	90,208			501	501,157
		Percent	0.1		1.3	31.8	0.3		39.5	8.2	0.7	18.0			0.1	100.0

- Continued -

Table 5. (p 2 of 2)

River System	Sample Size		Brood Year and Age Class													
			1983		1982			1981			1980			1979		
			0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	3.3	2.4	Total
Kasilof River: Total[a]	1,660	Numbers	355			112,798	213	115,923	32,870	872	12,628				304	275,963
		Percent	0.1			40.9	0.1	42.0	11.9	0.3	4.6				0.1	100.0
Crescent River: Total[a,f]	139	Numbers														NA
		Percent				6.5		15.8	13.0			64.0	0.7			100.0
Fish Creek[g]	1,306	Numbers		3,841		16,155	877	5,475	3,051		50	351				29,800
		Percent		12.9		54.2	2.9	18.4	10.2		0.2	1.2				100.0
Packers Creek[h]	1,028	Numbers		474		1,865	3,730	1,066	13,292			9,118	59			29,604
		Percent		1.6		6.3	12.6	3.6	44.9			30.8	0.2			100.0

[a] Source: King, B. and K. Tarbox. In press. Upper Cook Inlet salmon (*Oncorhynchus* spp.) escapement studies, 1986. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report, Juneau.

[b] Source: Marcuson, P. 1986. Larson Lake Project. Technical Progress Report. Cook Inlet Aquaculture Association. Soldotna, Alaska.

[c] Total represents weighted age composition of Yentna Station and Larson Creek based on an estimated escapement of 194,887 sockeye salmon.

[d] Source: Nelson, D.C., Athons, D.E and Carlon, J.A. 1986. Russian River sockeye salmon study. Alaska Department of Fish and Game. Division of Sport Fish, Federal Aid in Fish Restoration, Annual Performance Report, 1985-1986, Project AFS-44, 26(AFS-44-11): 1-59.

[e] Source: Flagg, L.B. and Litchfield, D.S. 1987. Hidden Lake Annual Data Report, 1986. Alaska Department of Fish and Game, Division of Fisheries Rehabilitation, Enhancement, and Development Division, Soldotna, Alaska.

[f] Crescent River project was terminated early.

[g] Age composition taken from original age-weight-length (AWL) data forms.

[h] Source: Marcuson, P. 1986. Packers Lake Project. Technical Progress Report. Cook Inlet Aquaculture Association. Soldotna, Alaska.

Table 6. Mean and standard error of scale variables from age-1.3 sockeye salmon used to construct linear discriminant functions in 1986.

Variable Number[a,b]	Characteristic	Susitna		Kenai		Kasilof	
		Mean	SE	Mean	SE	Mean	SE
	First Freshwater Annulus						
1	NC1FW	9.670	0.166	9.870	0.158	8.875	0.096
2	S1FW	113.300	1.857	121.495	1.625	105.485	1.035
4	C0-C4	64.380	0.621	68.940	0.542	64.925	0.419
5	C0-C6	83.477	0.802	88.714	0.602	83.355	0.499
7	C2-C4	20.840	0.315	23.745	0.308	21.310	0.224
8	C2-C6	39.877	0.508	43.487	0.444	39.740	0.330
10	C4-C6	18.918	0.305	19.668	0.281	18.430	0.211
12	C(NC-4)-E1FW	32.670	0.373	33.290	0.370	32.255	0.321
14	C2-E1FW	69.760	1.714	76.300	1.640	61.870	0.952
15	C4-E1FW	48.920	1.605	52.555	1.621	40.560	0.887
16	C0-C2/S1FW	0.400	0.006	0.385	0.006	0.419	0.004
17	C0-C4/S1FW	0.599	0.008	0.585	0.008	0.623	0.005
18	C0-C6/S1FW	0.750	0.009	0.747	0.009	0.799	0.006
20	C2-C4/S1FW	0.189	0.003	0.201	0.003	0.204	0.002
21	C2-C6/S1FW	0.356	0.004	0.364	0.004	0.381	0.003
23	C4-C6/S1FW	0.168	0.002	0.163	0.002	0.176	0.002
26	VAR 13/S1FW	0.140	0.003	0.130	0.003	0.145	0.002
27	S1FW/NC1FW	11.830	0.103	12.464	0.093	11.957	0.075
28	NC 1ST 3/4	5.570	0.120	5.665	0.117	4.995	0.070
29	MAX DIST	14.105	0.198	15.405	0.186	13.885	0.140
30	VAR 29/S1FW	0.129	0.002	0.130	0.002	0.133	0.001
	Plus Growth						
61	NCPG	4.485	0.138	4.410	0.122	5.005	0.104
62	SPGZ	48.250	1.731	47.925	1.496	49.355	1.110
	Freshwater and Plus Growth						
65	NC1+NC2+NCPG	14.155	0.143	14.280	0.117	13.880	0.122
66	S1F+S2F+SPGZ	161.550	1.634	169.420	1.290	154.840	1.287

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Table 6. (p 2 of 2)

Variable Number[a,b]	Characteristic	Susitna Mean	Susitna SE	Kenai Mean	Kenai SE	Kasilof Mean	Kasilof SE
	First Marine Annulus						
70	NC1OZ	24.325	0.180	25.380	0.173	24.830	0.158
71	S1OZ	384.060	2.753	391.975	2.564	388.430	2.404
72	EFW-C3	47.535	0.532	45.745	0.484	44.560	0.471
78	C3-C9	99.015	0.862	97.235	0.868	97.075	0.784
79	C3-C12	151.995	1.171	150.125	1.170	149.005	1.032
81	C6-C9	50.810	0.553	49.770	0.567	49.325	0.555
82	C6-C12	103.790	0.899	102.660	0.927	101.255	0.852
85	C(NC-6)-E1OZ	77.900	0.659	72.845	0.603	76.460	0.616
86	C(NC-3)-E1OZ	38.170	0.391	34.845	0.353	36.130	0.397
90	EFW-C3/S1OZ	0.125	0.002	0.118	0.001	0.116	0.001
91	EFW-C6/S1OZ	0.252	0.003	0.239	0.002	0.240	0.003
95	C3-C6/S1OZ	0.126	0.001	0.122	0.001	0.124	0.002
96	C3-C9/S1OZ	0.260	0.003	0.250	0.003	0.252	0.003
97	C3-C12/S1OZ	0.399	0.004	0.386	0.004	0.386	0.004
99	C6-C9/S1OZ	0.134	0.002	0.128	0.002	0.128	0.002
100	C6-C12/S1OZ	0.273	0.003	0.264	0.003	0.262	0.003
102	C9-C15/S1OZ	0.279	0.002	0.273	0.003	0.276	0.002
103	VAR 85/S1OZ	0.205	0.002	0.187	0.002	0.198	0.002
104	VAR 86/S1OZ	0.100	0.001	0.089	0.001	0.094	0.001
105	S1OZ/NC1OZ	15.842	0.088	15.487	0.077	15.678	0.070
106	NC 1ST 1/2	11.150	0.103	11.600	0.098	11.555	0.095
107	MAX DIST	25.190	0.329	25.595	0.335	25.565	0.301
108	VAR 107/S1OZ	0.066	0.001	0.066	0.001	0.066	0.001
	Second Marine Annulus						
109	S2OZ	322.165	2.759	345.505	2.507	329.225	2.409

[a] All measured distances are magnified 100 times.
[b] Scale sample sizes for the Susitna, Kenai, and Kasilof Rivers were 200, 211, and 200, respectively.

Table 7. Classification matrices derived from linear discriminant analyses of age-1.3 sockeye salmon scales from the Susitna, Kenai, and Kasilof Rivers, Upper Cook Inlet, 1986.

MODEL I[a]

Actual Group of Origin	Sample Size	Classified Group of Origin		
		Susitna	Kenai	Kasilof
Susitna	200	0.515	0.215	0.270
Kenai	211	0.170	0.680	0.150
Kasilof	200	0.200	0.145	0.655

Overall correctly classified = .617

MODEL II[a]

Actual Group of Origin	Sample Size	Classified Group of Origin	
		Susitna	Kasilof
Susitna	200	0.700	0.300
Kasilof	200	0.235	0.765

Overall correctly classified = .732

MODEL III[a]

Actual Group of Origin	Sample Size	Classified Group of Origin	
		Susitna	Kenai
Susitna	200	0.760	0.240
Kenai	211	0.230	0.770

Overall correctly classified = .765

MODEL IV[a]

Actual Group of Origin	Sample Size	Classified Group of Origin	
		Kenai	Kasilof
Kenai	211	0.770	0.230
Kasilof	200	0.195	0.805

Overall correctly classified = .788

[a] Variables included in each model are:
MODEL I   (7, 104, 66, 61, 2, 105, 109, 72, 16, 70)
MODEL II   (15, 90, 86, 62, 61, 105, 7)
MODEL III (104, 7, 109, 105, 107)
MODEL IV   (2, 17, 109, 66, 61, 105, 82, 72)

Table 8. Stock composition estimates and 90% confidence limits calculated from linear discriminant analyses of age-1.3 sockeye salmon by river system, fishery, and date for Upper Cook Inlet, 1986.

Fishery[a]	Date	Point Estimate (90% CI)		
		Susitna	Kenai	Kasilof
Central District Drift	6/27	Trace[b]	Trace[b]	1.000 (.889,1.000)
	6/30	Trace[b]	0.043 (0,.185)	0.957 (.815,1.000)
	7/04	Trace[b]	0.130 (0,.276)	0.870 (.724,1.000)
	7/07	0.134 (0,.433)	0.403 (.179,.627)	0.463 (.197,.730)
	7/11	0.071 (0,.365)	0.411 (.187,.635)	0.518 (.249,.787)
	7/14	0.177 (0,.478)	0.528 (.294,.763)	0.295 (.043,.546)
	7/15[c]	0.029 (0,.314)	0.641 (.402,.880)	0.330 (.080,.579)
	7/18	0.165 (0,.467)	0.399 (.175,.623)	0.436 (.171,.702)
	7/19[c]	0.024 (0,.309)	0.586 (.350,.821)	0.390 (.135,.646)
	7/21	0.203 (0,.507)	0.469 (.238,.700)	0.328 (.072,.584)
	7/26	0.280 (0,.594)	0.608 (.364,.852)	0.112 (0,.348)
	7/28	0.371 (.047,.695)	0.559 (.314,.804)	0.070 (0,.308)
	7/30	0.197 (0,.503)	0.731 (.483,.980)	0.072 (0,.299)

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Table 8. (p 2 of 3)

		Point Estimate (90% CI)		
Fishery[a]	Date	Susitna	Kenai	Kasilof
Cohoe/Ninilchik Beach	7/04	Trace[b]	0.113 (0,.258)	0.887 (.742,1.000)
	7/07	0.057 (0,.358)	0.264 (.052,.475)	0.680 (.396,.963)
	7/14	0.229 (0,.537)	0.409 (.182,.636)	0.361 (.100,.623)
	7/17	0.416 (.088,.744)	0.366 (.136,.597)	0.218 (0,.477)
	7/21	0.248 (0,.563)	0.276 (.061,.491)	0.476 (.201,.750)
	7/22	0.202 (0,.506)	0.450 (.221,.680)	0.348 (.090,.606)
Kalifonsky Beach	7/04	0.306 (0,.628)	0.212 (.002,.423)	0.482 (.202,.761)
	7/11	0.205 (0,.509)	0.487 (.255,.720)	0.308 (.054,.562)
	7/18	0.156 (0,.456)	0.643 (.401,.885)	0.200 (0,.440)
	7/28	0.064 (0,.353)	0.674 (.432,.915)	0.262 (.019,.505)
Salamatof Beach	7/11	0.578 (0,1.000)	0.237 (0,.767)	0.184 (0,.812)
	7/26	Trace[b]	1.000 (.880,1.000)	Trace[b]
	7/30	Trace[b]	0.948 (.799,1.000)	0.052 (0,.201)
Central District West Side		NA[d]	NA	NA
Kalgin Island	6/30	0.177 (0,.491)	0.192 (0,.397)	0.631 (.346,.917)

- Continued -

Table 8. (p 3 of 3)

| Fishery[a] | Date | Susitna | Point Estimate (90% CI) | |
			Kenai	Kasilof
Northern District East Side	7/25	0.887 (.722,1.000)	0.113 (0,.278)	Trace[b]
Northern District West Side	7/21	1.000 (.719,1.000)	Trace[b]	Trace[b]
	7/25	0.464 (.127,.801)	0.210 (0,.427)	0.325 (.049,.601)

[a] The Central district drift catches were classified with a model which included Susitna, Kenai, and Kasilof Rivers. The east-side beach set net catches were classified with a three-way model which included Susitna, Kenai, and Kasilof Rivers. The Central District west side set net catches were assumed to be of Crescent River origin. The Kalgin Island set net catch was classified with a three-way model which included Susitna, Kenai, and Kasilof Rivers. The Northern District east-side set net catch was classified with a two-way model which included Susitna and Kenai Rivers. The Northern District west side set net catches were assumed to originate from the Susitna River. However, classifications of the commercial catches were made using the three-way model including Susitna, Kenai, and Kasilof Rivers.

[b] Trace was recorded for systems that were originally included in the model used to classify the catch and their point estimates were less than zero but the upper bounds of the 90% confidence interval was positive.

[c] Drift fishing permitted in a three mile corridor only (south of Kasilof River along the Kenai Peninsula where set gillnetting is permitted).

[d] Not available.

Table 9. Total harvest of sockeye salmon age-1.3 by fishery and river system, Upper Cook Inlet, 1986.

Fishery[a]	System	Estimated Proportion	Commercial Harvest
Northern District East Side	Susitna	0.887	12,597
	Kenai	0.113	1,605
	Total	1.000	14,202
Northern District West Side	Susitna	1.000	60,209
Central District Drift	Susitna	0.159	258,759
	Kenai	0.467	762,371
	Kasilof	0.374	609,330
	Total	1.000	1,630,460
Central District West Side	Crescent	NA[b]	17,042
Kalgin Island	Susitna	0.206	7,728
	Kenai	0.558	20,965
	Kasilof	0.236	8,864
	Total	1.000	37,557
Salamatof Beach	Susitna	0.000	0
	Kenai	0.948	130,624
	Kasilof	0.052	7,165
	Total	1.000	137,789
Kalifonsky Beach	Susitna	0.133	21,943
	Kenai	0.631	104,106
	Kasilof	0.236	38,936
	Total	1.000	164,985

- Continued -

Table 9. (p 2 of 2)

Fishery[a]	System	Estimated Proportion	Commercial Harvest
Cohoe/Ninilchik	Susitna	0.239	71,308
Beach	Kenai	0.370	110,393
	Kasilof	0.391	116,658
	Total	1.000	298,359
Total	Susitna	0.183	432,544
	Kenai	0.478	1,130,063
	Kasilof	0.330	780,954
	Crescent	0.007	17,042
	Unknown	0.002	4,222
	Total	1.000	2,364,825

[a] The commercial harvest values include estimated and imputed quantities.

[b] Due to insufficient sampling no estimate is available, but the assumption that the harvest is primarily Crescent River origin is made.

Table 10. Stock composition of sockeye salmon commercial catches by age class and fishery, Upper Cook Inlet, 1986.

Fishery[a]	River System	0.2 %	0.2 #	1.1 %	1.1 #	0.3 %	0.3 #	1.2 %	1.2 #	2.1 %	2.1 #	0.4 %	0.4 #	1.3 %	1.3 #	2.2 %	2.2 #	1.4 %	1.4 #	2.3 %	2.3 #	Other %	Other #	Total %	Total #
Northern East Side	Susitna	0.0	0	0.0	0	85.3	379	77.7	13,898	100.0	221	0.0	0	88.7	12,597	76.2	5,073	0.0	0	68.6	2,861	0.0	0	78.9	35,02
	Kenai	0.0	0	0.0	0	14.7	65	22.3	3,989	0.0	0	0.0	0	11.3	1,605	23.8	1,585	0.0	0	31.4	1,311	0.0	0	19.3	8,55
	Unknown	0.0	0	100.0	400	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	100.0	400	1.8	80
	Total	0.0	0	100.0	400	100.0	444	100.0	17,887	100.0	221	0.0	0	100.0	14,202	100.0	6,658	0.0	0	100.0	4,172	100.0	400	100.0	44,38
Northern West Side	Susitna	100.0	100	100.0	40	100.0	1,921	100.0	11,354	100.0	62	100.0	133	100.0	60,209	100.0	4,591	100.0	577	100.0	13,506	100.0	195	0.0	92,68
	Total	100.0	100	100.0	40	100.0	1,921	100.0	11,354	100.0	62	100.0	133	100.0	60,209	100.0	4,591	100.0	577	100.0	13,506	100.0	195	100.0	92,68
Central District Drift	Susitna	61.6	205	0.0	0	22.2	6,510	6.0	29,465	0.0	0	0.0	0	15.9	258,759	5.2	12,015	5.3	333	7.5	28,549	0.0	0	12.1	335,83
	Kenai	27.0	90	0.0	0	77.8	22,841	50.3	247,573	0.0	0	0.0	0	46.8	762,371	43.8	101,105	78.0	4,865	75.9	288,917	0.0	0	51.5	1,427,76
	Kasilof	11.4	38	0.0	0	0.0	0	43.7	215,065	0.0	0	0.0	0	37.4	609,330	51.0	117,865	16.6	1,036	16.6	63,189	0.0	0	36.3	1,006,52
	Unknown	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	100.0	1,441	0.1	1,44
	Total	100.0	333	0.0	0.0	100.0	29,351	100.0	492,103	0.0	0	0.0	0	100.1	1,630,460	100.0	230,986	99.9	6,234	100.0	380,655	100.0	1,441	100.0	2,771,56

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Table 10. (p 2 of 3)

		Age Class																							
		0.2		1.1		0.3		1.2		2.1		0.4		1.3		2.2		1.4		2.3		Other		Total	
Fishery[a]	River System	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
Central West Side	Crescent	0.0	0	0.0	0	100.0	383	100.0	5,691	100.0	306	0.0	0	100.0	17,042	100.0	14,285	100.0	30	100.0	36,488	100.0	611	100.0	74,83
	Total	0.0	0	0.0	0	100.0	383	100.0	5,691	100.0	306	0.0	0	100.0	17,042	100.0	14,285	100.0	30	100.0	36,488	100.0	611	100.0	74,83
Kalgin Is.	Susitna	0.0	0	0.0	0	26.6	205	10.0	781	0.0	0	0.0	0	20.6	7,728	9.6	447	0.0	0	21.0	2,096	0.0	0	18.5	11,25
	Kenai	0.0	0	0.0	0	73.4	565	56.0	4,375	0.0	0	0.0	0	55.8	20,965	48.8	2,273	0.0	0	68.9	6,877	100.0	166	57.8	35,22
	Kasilof	0.0	0	0.0	0	0.0	0	34.0	2,656	0.0	0	0.0	0	23.6	8,864	41.6	1,937	0.0	0	10.1	1,008	0.0	0	23.7	14,46
	Unknown	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
	Total	0.0	0	0.0	0	100.0	770	100.0	7,813	0.0	0	0.0	0	100.0	37,557	100.0	4,657	0.0	0	100.0	9,981	100.0	166	100.0	60,94
Salamatof Beach	Susitna	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
	Kenai	100.0	325	0.0	0	100.0	3,914	95.0	37,746	0.0	0	0.0	0	94.8	130,624	93.5	20,065	100.0	1,095	97.5	54,055	0.0	0	96.5	247,82
	Kasilof	0.0	0	0.0	0	0.0	0	5.0	879	0.0	0	0.0	0	5.2	7,165	6.5	562	0.0	0	2.5	489	0.0	0	3.5	9,09
	Total	100.0	325	0.0	0	100.0	3,914	100.0	38,625	0.0	0	0.0	0	100.0	137,789	100.0	20,627	100.0	1,095	100.0	54,544	0.0	0	100.0	256,91

-Continued-

Table 10. (p 3 of 3)

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		Age Class																						
		0.2		1.1		0.3		1.2		2.1		0.4		1.3		2.2		1.4		2.3		Other		Total	
Fishery[a]	River System	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
Kalifonsky Beach	Susitna	79.3	101	0.0	0	6.6	104	1.9	3,732	0.0	0	0.0	0	13.3	21,943	1.8	1,323	4.0	58	2.2	1,193	0.0	0	5.8	28,45
	Kenai	20.7	26	0.0	0	93.4	1,467	45.2	88,775	0.0	0	0.0	0	63.1	104,106	47.4	34,831	76.0	1,194	82.7	44,842	76.8	241	55.9	275,48
	Kasilof	0.0	0	0.0	0	0.0	0	52.9	103,898	0.0	0	0.0	0	23.6	38,936	50.8	37,329	21.0	326	15.1	8,188	23.2	73	38.3	188,75
	Total	100.0	127	0.0	0	100.0	1,571	100.0	196,405	0.0	0	0.0	0	100.0	164,985	100.0	73,483	100.0	1,578	100.0	54,223	100.0	314	100.0	492,68
Cohoe/ Ninilchik Beach	Susitna	33.0	20	0.0	0	28.9	1,020	11.1	42,255	20.9	37	0.0	0	23.9	71,308	8.6	13,292	5.3	342	12.7	10,273	0.0	0	14.9	138,54
	Kenai	33.5	21	0.0	0	71.1	2,510	41.7	158,741	27.2	48	100.0	224	37.0	110,393	31.7	48,996	56.4	3,643	66.3	53,632	79.2	1,777	41.0	379,98
	Kasilof	33.5	21	0.0	0	0.0	0	47.2	179,678	51.9	92	0.0	0	39.1	116,658	59.7	92,272	38.3	2,474	21.0	16,988	20.8	467	44.1	408,65
	Total	0.0	62	0.0	0	100.0	3,530	100.0	380,673	100.0	177	100.0	224	100.0	298,359	100.0	154,560	100.0	6,460	100.0	80,893	100.0	2,244	100.0	927,18
Total[b]	Susitna	42.2	426	9.1	40	24.2	10,139	8.8	101,484	38.1	320	37.3	133	18.3	432,544	7.2	36,741	8.2	1,310	9.1	58,478	3.6	195	13.5	641,81
	Kenai	45.8	462	0.0	0	74.7	31,362	47.0	541,199	5.7	48	62.7	224	47.8	1,130,063	40.7	208,854	67.6	10,797	69.9	449,634	40.0	2,184	50.1	2,374,82
	Kasilof	5.8	59	0.0	0	0.0	0	43.6	502,176	10.9	92	0.0	0	33.0	780,954	48.7	249,966	24.0	3,836	14.0	89,861	9.9	540	34.3	1,627,48
	Crescent	0.0	0	0.0	0	0.9	383	0.5	5,691	36.4	306	0.0	0	0.7	17,042	2.8	14,285	0.2	30	5.7	36,488	11.2	611	1.6	74,83
	Unknown	6.1	62	90.9	400	0.0	93	0.0	1,409	0.0	74	0.0	0	0.2	4,222	0.0	3,539	0.0	0	0.0	9,039	0.0	1,927	0.4	20,76
	Total	100.0	1009	100.0	440	99.8	41,977	99.9	1,151,959	91.2	840	100.0	357	100.0	2,364,825	99.3	513,385	100.0	15,974	98.6	643,501	64.7	5,457	100.0	4,739,72

[a] The values shown by fishery include estimated and imputed quantities.
[b] Unknown total represents commercial catches from Chinitna Bay and West Foreland fisheries that were not allocated to the four major river systems and other age classes not represented in one of the eight designated fisheries.

Table 11. Commercial harvest of sockeye salmon by fishery and river system, Upper Cook Inlet, 1986.

River System[a,b]		Northern East Side Set Net	Northern West Side Set Net	Central District Drift	Central West Side Set Net	Kalgin Island Set Net	Salamatof Beach Set Net	Kalifonsky Beach Set Net	Cohoe/Ninilchik Beach Set Net	West Foreland/ Chinitna Bay Set Net	Total
Susitna	Numbers	35,029	92,688	335,836	0	11,257	0	28,453	138,547	0	641,810
	Percent	5.5	14.4	52.3	0.0	1.8	0.0	4.4	21.6	0.0	100.0
Kenai	Numbers	8,555	0	1,427,762	0	35,221	247,824	275,483	379,985	0	2,374,830
	Percent	0.4	0.0	60.1	0.0	1.5	10.4	11.6	16.0	0.0	100.0
Kasilof	Numbers	0	0	1,006,523	0	14,465	9,095	188,751	408,650	0	1,627,484
	Percent	0.0	0.0	61.8	0.0	0.9	0.6	11.6	25.1	0.0	100.0
Crescent	Numbers	0	0	0	74,836	0	0	0	0	0	74,836
	Percent	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
Unknown	Numbers	800	0	1,441	0	0	0	0	0	18,523	20,764
	Percent	3.9	0.0	6.9	0.0	0.0	0.0	0.0	0.0	89.2	100.0
Total	Numbers	44,384	92,688	2,771,562	74,836	60,943	256,919	492,687	927,182	18,523	4,739,724
	Percent	0.9	2.0	58.5	1.6	1.3	5.4	10.4	19.6	0.4	100.0

[a] Unknown represents commercial catches from Chinitna Bay and West Foreland fisheries that were not allocated to the four major river systems and other age classes not represented in one of the eight designated fisheries.
[b] The values in this table include estimated and imputed quantities.

Table 12. Commercial and personal use catch, escapement, and total return of sockeye salmon by major age classes and river systems, Upper Cook Inlet, 1986.

Commercial Catch: River System	Exploitation Rate		Age Class 1.2	1.3	2.2	2.3	Other	Total	Escapement: River System		Age Class 1.2	1.3	2.2	2.3	Other	Total
Susitna	0.77	Number	101,484	432,544	36,741	58,478	12,564	641,811	Susitna	Number	42,645	119,874	10,213	15,290	6,865	194,887[b]
		Percent	15.8	67.4	5.7	9.1	2.0	100.0		Percent	13.2	26.3	10.0	9.3	30.1	18.2
Kenai	0.82	Number	541,199	1,130,063	208,854	449,634	45,079	2,374,829	Kenai	Number	159,368	197,957	41,095	90,208	12,529	501,157[c]
		Percent	22.8	47.6	8.8	18.9	1.9	100.0		Percent	49.5	43.4	40.1	54.7	55.0	46.9
Kasilof	0.84	Number	502,176	780,954	249,966	89,861	4,526	1,627,483	Kasilof	Number	112,798	115,923	32,870	12,628	1,744	275,963[d]
		Percent	30.9	48.0	15.4	5.5	0.3	100.0		Percent	35.0	25.4	32.1	7.7	7.7	25.8
Crescent	0.49	Number	7,100	21,264	17,824	45,527	1,644	93,359	Crescent	Number	7,296	21,888	18,336	46,848	1,632	96,000[e]
		Percent	7.6	22.8	19.1	48.8	1.8	100.0		Percent	2.3	4.8	17.9	28.4	7.2	9.0
Total		Number	1,151,959	2,364,825	513,385	643,500	63,813	4,737,482[a]	Total	Number	322,107	455,642	102,514	164,974	22,770	1,068,007
		Percent	24.3	49.9	10.8	13.6	1.3	100.0		Percent	100.0	100.0	100.0	100.0	100.0	100.0

-Continued-

Table 12. (p 2 of 2)

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Personal Use Catch: River System		Age Class 1.2	1.3	2.2	2.3	Other	Total
Kenai Sport[h]	Number	4,632	13,022	1,109	1,661	746	21,170
	Percent	21.9	61.5	5.2	7.8	3.5	100.0
Kasilof Personal Use Dipnet[f,h]	Number	13,211	13,579	3,850	1,480	204	32,324
	Percent	40.9	42.0	11.9	4.6	0.6	100.0
Kasilof Personal Use Gillnet[g,h]	Number	3,927	4,037	1,144	440	61	9,609
	Percent	40.9	42.0	11.9	4.6	0.6	100.0
Total	Number	21,770	30,638	6,104	3,581	1,010	63,103
	Percent	34.5	48.6	9.7	5.7	1.6	100.0

Total Return: River System		Age Class 1.2	1.3	2.2	2.3	Other	Total
Susitna	Number	144,129	552,418	46,954	73,768	19,429	836,698
	Percent	17.2	66.0	5.6	8.8	2.3	100.0
Kenai	Number	705,199	1,341,042	251,058	541,503	58,354	2,897,156
	Percent	24.3	46.3	8.7	18.7	2.0	100.0
Kasilof	Number	632,112	914,493	287,830	104,410	6,534	1,945,379
	Percent	32.5	47.0	14.8	5.4	0.3	100.0
Crescent	Number	14,396	43,152	36,160	92,375	3,276	189,359
	Percent	7.6	22.8	19.1	48.8	1.7	100.0
Total	Number	1,495,836	2,851,105	622,003	812,056	87,593	5,868,592[i]
	Percent	25.5	48.6	10.6	13.8	1.5	100.0

[a] Total does not include 315 fish of "unknown" origin.

[b] Susitna River escapement represents the combination of sonar count from Yentna River, weir count at Larson Creek and an estimate of remainder of the Susitna River drainage not monitored.

[c] Kenai River escapement represents sonar count from the mainstem and should be considered a total river-wide estimate.

[d] Kasilof River escapement represents sonar count from the mainstem and should be considered a total river-wide estimate.

[e] Crescent River escapement represents an estimate based on using the calculated exploitation rate comparing the Western Subdistrict commercial harvest to Crescent River escapement rates prior to terminating escapement count activities.

[f] Source: Bendock, T. 1986. Kasilof Personal Use Dip Net Fishery. Report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Division of Sport Fish, Soldotna, Alaska.

[g] Source: Ruesch, P. 1986. Upper Cook Inlet Management Report to the Alaska Board of Fisheries. Upper Cook Inlet Data Report No. 86-7. Division of Commercial Fisheries, Alaska Department of Fish and Game, Soldotna, Alaska.

[h] Escapement age composition was used to expand the catches.

[i] The estimate of total return only accounts for the four major river systems monitored. Therefore, this is a minimum estimate of total return.

Table 13. Sockeye salmon return by brood year and age class and return per spawner information for the Susitna River, Upper Cook Inlet.

Brood Year	Spawners	Return by Age Class				Total[a,b]	Return per Spawner
		1.2	1.3	2.2	2.3		
1966					43,207		
1967			206,250	6,656	12,717		
1968	61,010	21,005	147,208	10,043	4,997	183,253	3.0
1969	41,346	64,808	92,160	6,678	3,363	167,009	4.0
1970	44,371	75,213	170,546	9,537	2,488	257,784	5.8
1971	114,707	135,948	314,288	6,891	5,594	462,721	4.0
1972	91,927	128,451	502,234	25,950	17,350	673,985	7.3
1973	116,093	128,475	185,407	11,822	6,806	332,510	2.9
1974	71,849	133,795	118,312	26,451	34,547	313,105	4.4
1975	108,000	197,737	206,863	27,441	39,755	471,796	4.4
1976	111,000	214,715	640,532	23,349	68,883	947,479	8.5
1977	232,724	57,533	345,364	16,908	28,767	448,572	1.9
1978	93,029	103,111	527,932	48,362	110,390	789,795	8.5
1979	154,848	408,559	569,758	48,526	60,754	1,087,597	7.0
1980	189,231	197,480	810,049	65,707	73,768	1,147,004	6.1
1981	338,353	259,603	552,418	46,954		858,975	2.5[c]
1982	262,687	144,129					
1983	171,564						
1984	275,581						
1985	225,957						
1986	194,887[d]						
AVG[e]	110,010	143,602	356,204	25,205	35,189	560,201	5.2

[a] Distribution of 1985 commercial catches based on scale pattern analyses as documented in Cross and Goshert (In press).
Distribution of 1984 commercial catches based on scale pattern analyses as documented in Cross et al. 1987.
Distribution of 1983 commercial catches based on scale pattern analyses reported in Cross et al. 1986.
Distribution of 1982 commercial catches based on scale pattern analyses and migratory timing reported in Cross et al. 1985.
Distribution of 1978-1981 commercial catches based on scale pattern analyses and the distribution of 1972-1977 commercial catches based on escapement age composition as reported in Cross et al. 1983a.
[b] Total returns only include age groups 1.2, 1.3, 2.2, 2.3.
[c] Preliminary return-per-spawner estimate. Estimate represents a minimum value because the return of six-year old fish has not occurred yet.
[d] Represents total escapement due to unavailability of sport catch.
[e] Average calculated for brood years 1968 through 1980.

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Table 14. Sockeye salmon return by brood year and age class and return per spawner information for the Kenai River, Upper Cook Inlet.

Return by Age Class

Brood Year	Spawners	1.2	1.3	2.2	2.3	Total[a,b]	Return per Spawner
1966					163,441		
1967			318,338	148,526	114,176		
1968	82,180	159,584	628,356	58,057	68,402	914,399	11.1
1969	51,850	26,064	223,052	76,559	74,662	400,337	7.7
1970	72,400	55,509	202,006	132,228	130,287	520,030	7.2
1971	289,270	32,518	455,242	237,802	250,926	976,488	3.4
1972	301,950	443,153	1,496,332	147,373	99,741	2,186,599	7.2
1973	358,070	103,999	2,050,840	81,664	39,706	2,276,209	6.4
1974	144,470	37,255	361,109	75,709	128,564	602,637	4.2
1975	128,500	126,899	484,014	149,819	50,283	811,015	6.3
1976	353,160	226,646	737,456	78,617	118,783	1,161,502	3.3
1977	663,627	132,782	2,086,361	48,529	295,045	2,562,717	3.9
1978	349,928	91,983	3,050,186	49,875	204,663	3,396,707	9.7
1979	245,842	165,312	429,546	110,126	215,571	920,555	3.7
1980	411,918	139,367	1,219,090	232,630	541,503	2,132,590	5.2
1981	369,829	239,603	1,341,042	251,058		1,831,703	5.0[c]
1982	535,862	705,199					
1983	565,941						
1984	311,318						
1985	402,138						
1986	449,957						
AVG[d]	265,628	133,929	1,032,584	113,768	170,626	1,450,907	6.1

[a] Distribution of 1985 commercial catches based on scale pattern analyses as documented in Cross and Goshert (*In press*).
Distribution of 1984 commercial catches based on scale pattern analyses as documented in Cross et al. 1987.
Distribution of 1983 commercial catches based on scale pattern analyses reported in Cross et al. 1986.
Distribution of 1982 commercial catches based on scale pattern analyses and migratory timing reported in Cross et al. 1985.
Distribution of 1978-1981 commercial catches based on scale pattern analyses and the distribution of 1972-1977 commercial catches based on escapement age composition as reported in Cross et al. 1983a.
[b] Total returns only include age groups 1.2, 1.3, 2.2, 2.3.
[c] Preliminary return-per-spawner estimate. Estimate represents a minimum value because the return of six-year old fish has not occurred yet.
[d] Average calculated for brood years 1968 through 1980.

Table 15. Sockeye salmon return by brood year and age class and return per spawner information for the Kasilof River, Upper Cook Inlet.

Brood Year	Spawners	Return by Age Class 1.2	1.3	2.2	2.3	Total[a,b]	Return per Spawner
1966					47,724		
1967			107,418	7,327	3,446		
1968	89,000	104,619	54,201	14,693	3,572	177,085	2.0
1969	46,000	10,677	115,328	7,492	7,709	141,206	3.1
1970	38,000	40,883	11,891	80,516	66,341	199,631	5.3
1971	90,000	28,182	191,159	107,736	58,593	385,670	4.3
1972	113,000	121,115	122,578	122,678	35,036	401,407	3.6
1973	40,000	108,465	299,775	48,922	15,763	472,925	11.8
1974	69,795	183,732	180,601	59,799	67,629	491,761	7.0
1975	47,832	194,165	304,276	80,138	11,643	590,222	12.3
1976	133,537	351,938	354,229	48,702	99,774	854,643	6.4
1977	153,493	185,027	837,384	77,653	40,604	1,140,668	7.4
1978	112,550	239,614	297,041	66,376	88,722	691,753	6.1
1979	151,758	292,399	255,132	132,357	40,043	719,931	4.7
1980	185,672	304,740	391,797	215,935	104,410	1,016,882	5.5
1981	256,137	735,615	914,493	287,830		1,937,938	7.6[c]
1982	178,955	632,112					
1983	207,319						
1984	227,101						
1985	497,967						
1986	275,963[d]						
AVG[e]	97,741	166,581	262,722	81,769	49,218	560,291	6.1

[a] Distribution of 1985 commercial catches based on scale pattern analyses as documented in Cross and Goshert (*In press*).
Distribution of 1984 commercial catches based on scale pattern analyses as documented in Cross et al. 1987.
Distribution of 1983 commercial catches based on scale pattern analyses reported in Cross et al. 1986.
Distribution of 1982 commercial catches based on scale pattern analyses and migratory timing reported in Cross et al. 1985.
Distribution of 1978-1981 commercial catches based on scale pattern analyses and the distribution of 1972-1977 commercial catches based on escapement age composition as reported in Cross et al. 1983a.
[b] Total returns only include age groups 1.2, 1.3, 2.2, 2.3.
[c] Preliminary return-per-spawner estimate. Estimate represents a minimum value because the return of six-year old fish has not occurred yet.
[d] Represents total escapement due to unavailability of sport catch.
[e] Average calculated for brood years 1968 through 1980.

Table 16. Sockeye salmon return by brood year and age class and return per spawner information for the Crescent River, Upper Cook Inlet.

Brood Year	Spawners	Return by Age Class				Total[a,b]	Return per Spawner
		1.2	1.3	2.2	2.3		
1966					9,825		
1967			67,120	4,203	4,605		
1968	55,000	17,330	31,840	1,961	1,184	52,315	1.0
1969	51,000	7,948	27,816	1,810	2,906	40,480	0.8
1970	38,000	14,864	49,846	2,729	7,944	75,383	2.0
1971	44,000	10,394	55,063	3,429	12,895	81,781	1.9
1972	62,000	14,048	97,878	5,315	10,782	128,023	2.1
1973	29,000	19,281	93,223	0	216	112,720	3.9
1974	28,000	4,909	90,765	1,137	3,131	99,942	3.6
1975	41,000	35,113	141,777	6,867	28,164	211,921	5.2
1976	51,000	9,035	21,884	5,733	17,352	54,004	1.1
1977	87,000	5,060	170,079	1,020	77,732	253,891	2.9
1978	74,000	15,551	242,787	56,106	133,627	448,071	6.1
1979	87,000	16,213	60,977	49,690	219,831	346,711	4.0
1980	91,000	6,113	231,050	66,653	92,375	396,191	4.4
1981	41,000	11,565	43,152	36,160		90,877	2.2[c]
1982	58,957	14,396					
1983	92,343						
1984	118,345						
1985	128,627						
1986	96,000						
AVG[d]	56,769	13,528	101,153	15,573	46,780	177,033	3.0

[a] Distribution of 1985 commercial catches based on scale pattern analyses as documented in Cross and Goshert (In press).
Distribution of 1984 commercial catches based on scale pattern analyses as documented in Cross et al. 1987.
Distribution of 1983 commercial catches based on scale pattern analyses reported in Cross et al. 1986.
Distribution of 1982 commercial catches based on scale pattern analyses and migratory timing reported in Cross et al. 1985.
Distribution of 1978-1981 commercial catches based on scale pattern analyses and the distribution of 1972-1977 commercial catches based on escapement age composition as reported in Cross et al. 1983a.
[b] Total returns only include age groups 1.2, 1.3, 2.2, 2.3.
[c] Preliminary return-per-spawner estimate. Estimate represents a minimum value because the return of six-year old fish has not occurred yet.
[d] Average calculated for brood years 1968 through 1980.

Figure 1. Upper Cook Inlet area showing the commercial fishing districts and major sockeye salmon spawning river systems.

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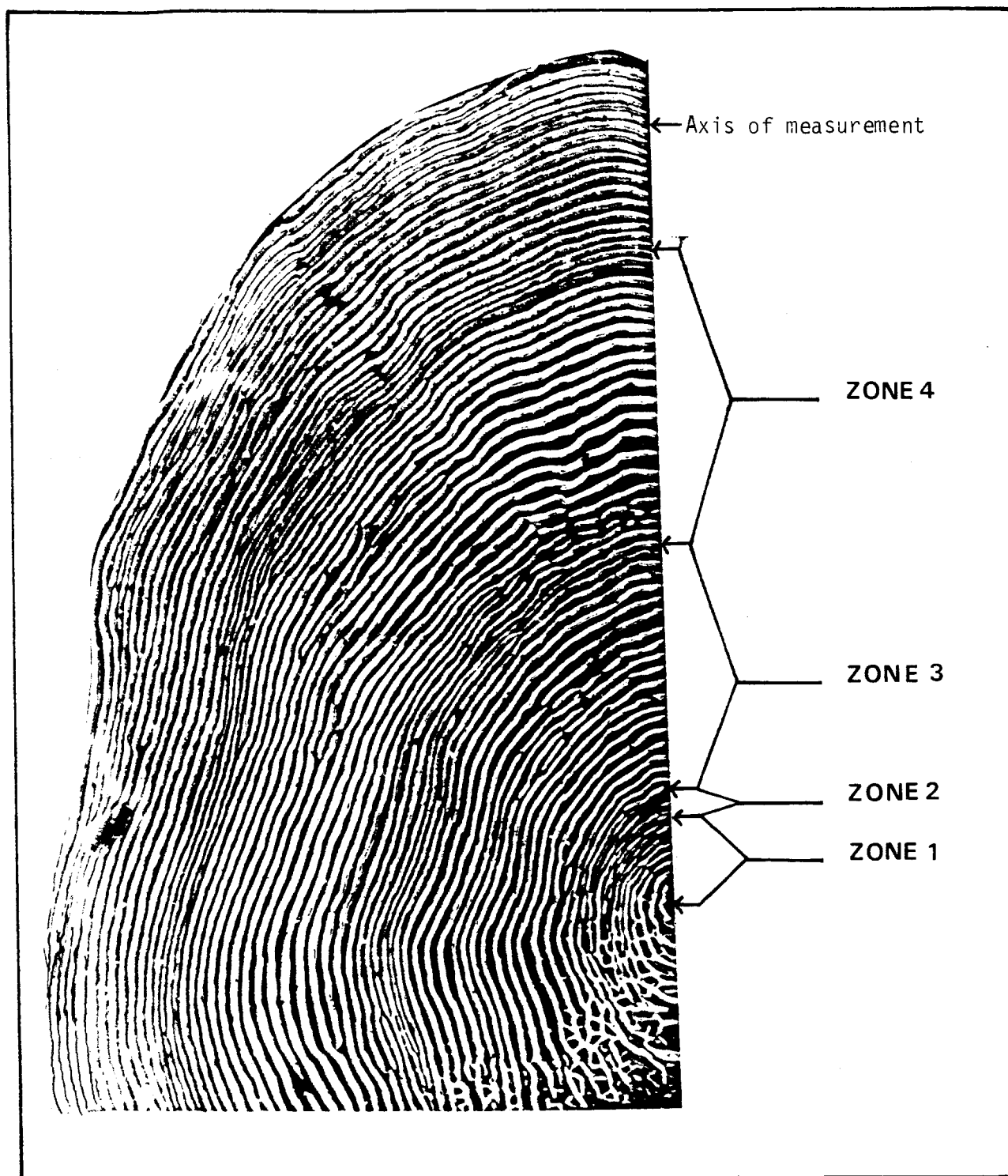
Figure 2. Age-1.3 sockeye salmon scale showing the freshwater and marine growth zones that are measured to generate variables to build linear discriminant functions.
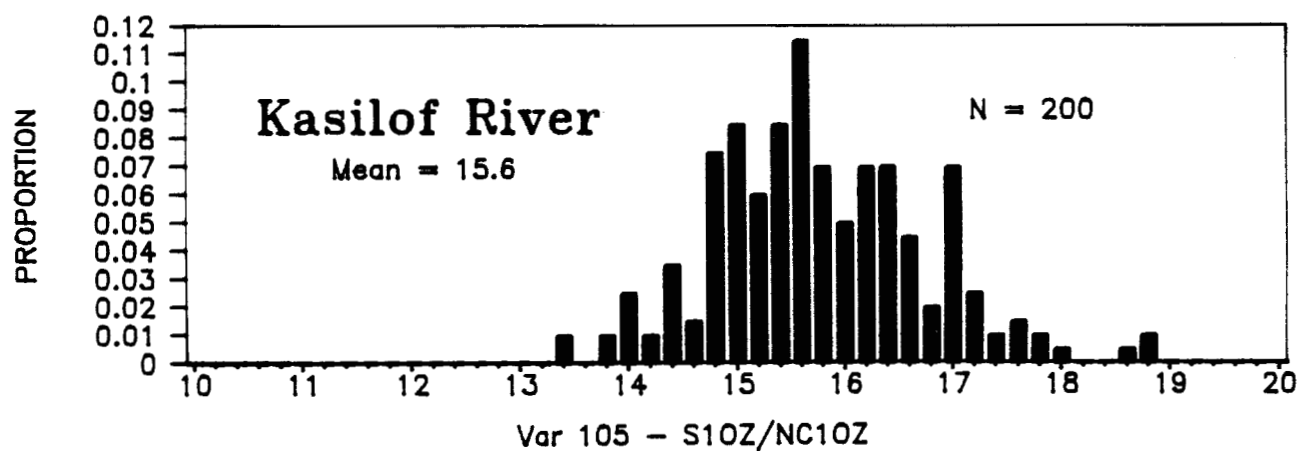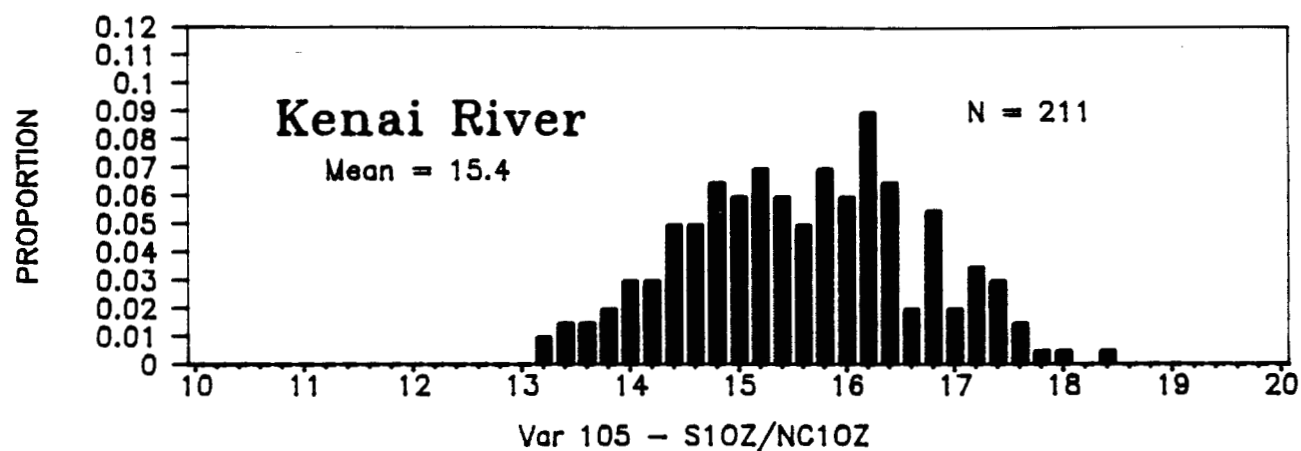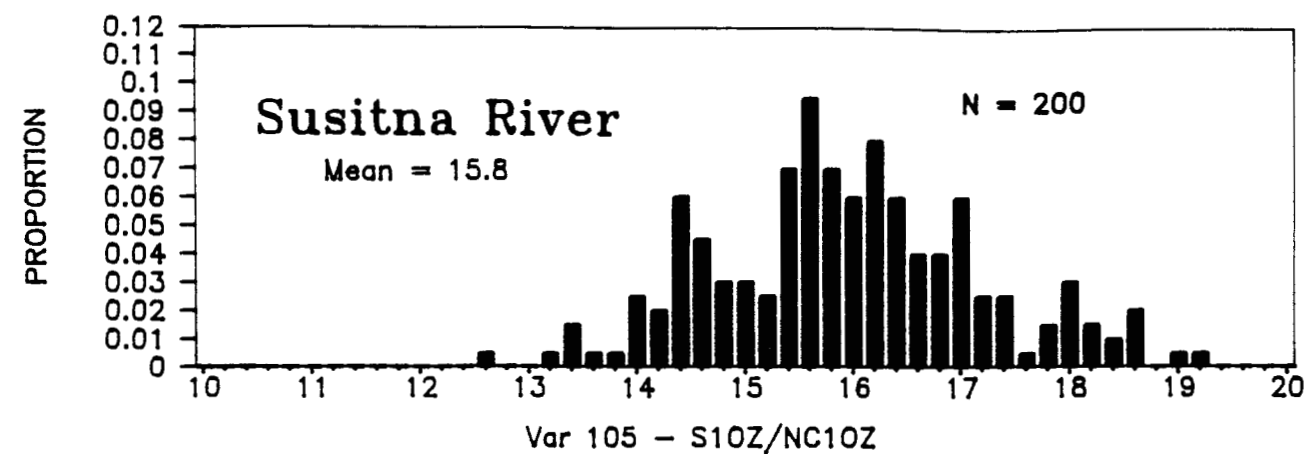
Figure 3. Frequency distribution of variable 105 derived from age-1.3 sockeye salmon escapements into the Susitna, Kenai, and Kasilof Rivers, 1986.
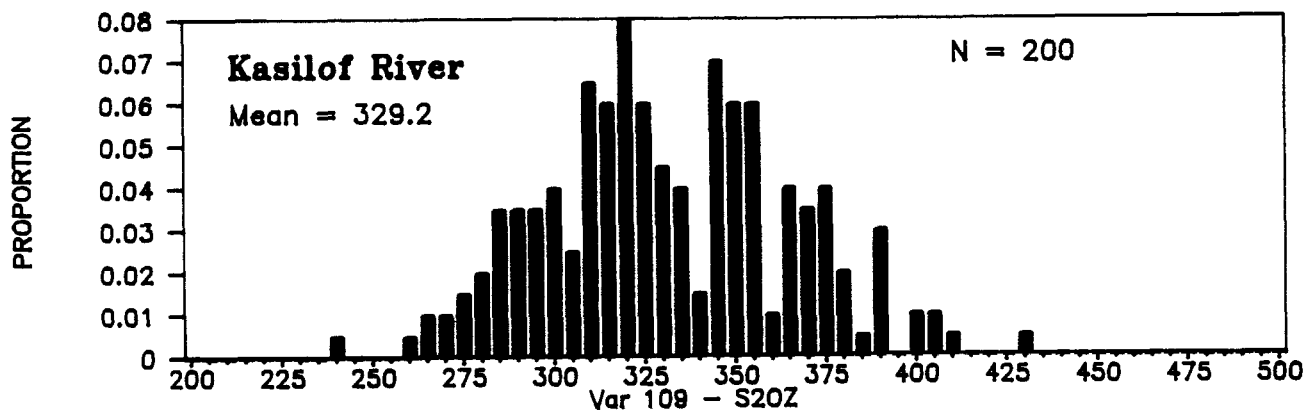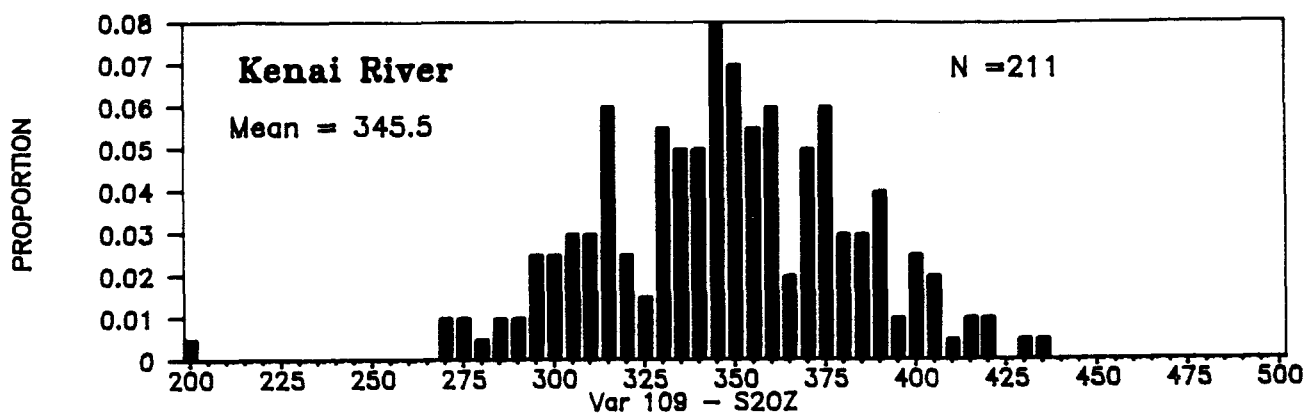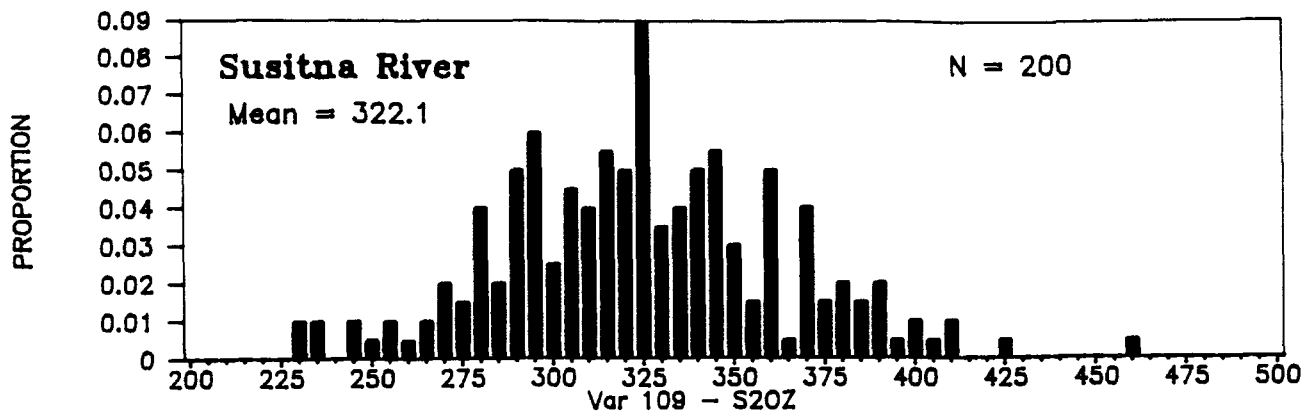
Figure 4. Frequency distributions of variable 109 derived from age-1.3
sockeye salmon escapements into the Susitna, Kenai, and Kasilof
Rivers, 1986.
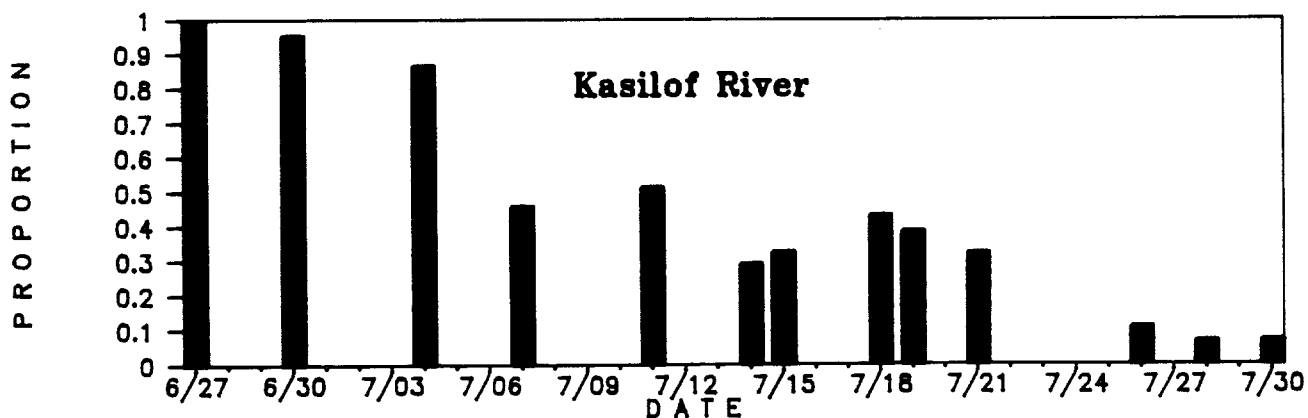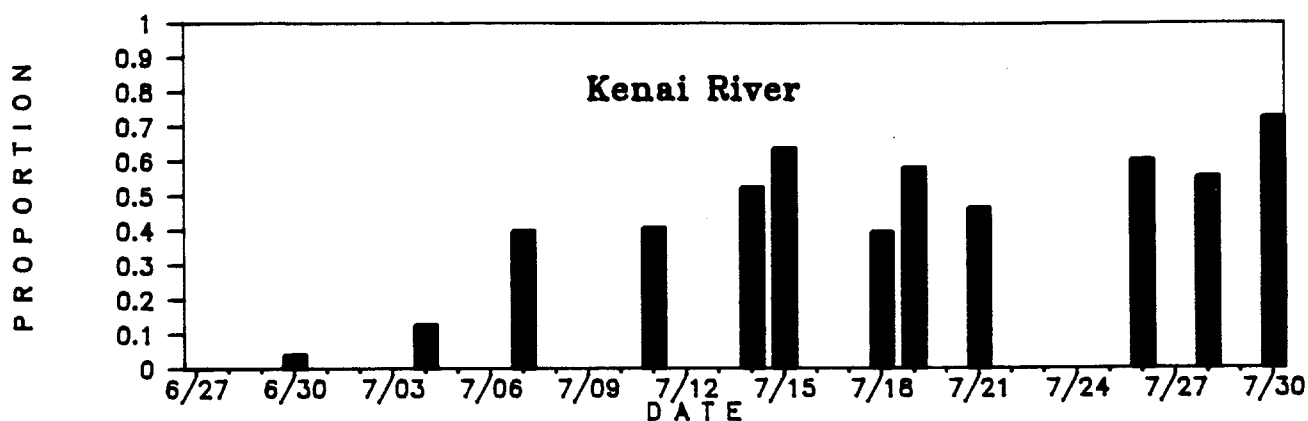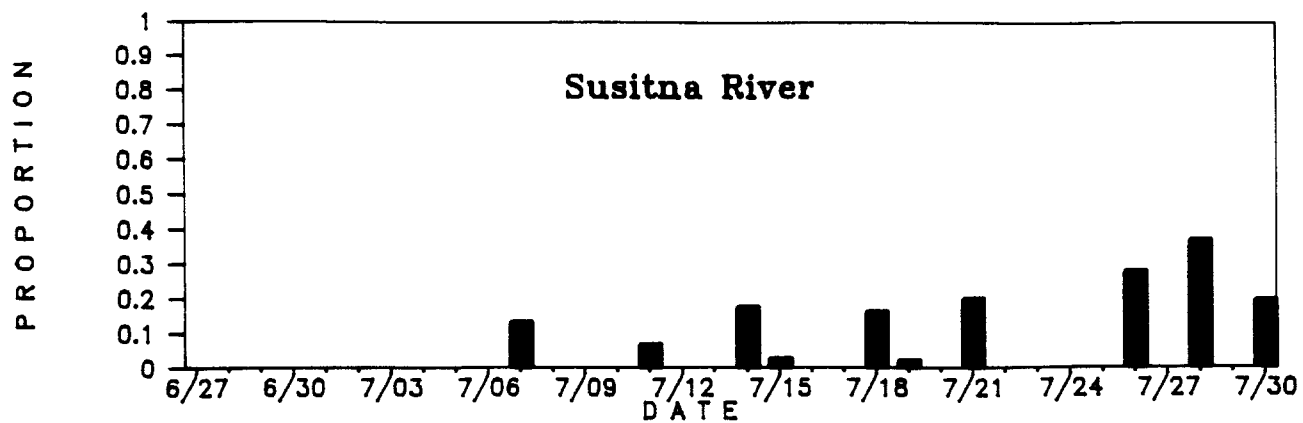
Figure 5.   Stock composition estimates of age-1.3 sockeye salmon by river system derived from the Central District drift gill net fishery, Upper Cook Inlet, 1986.
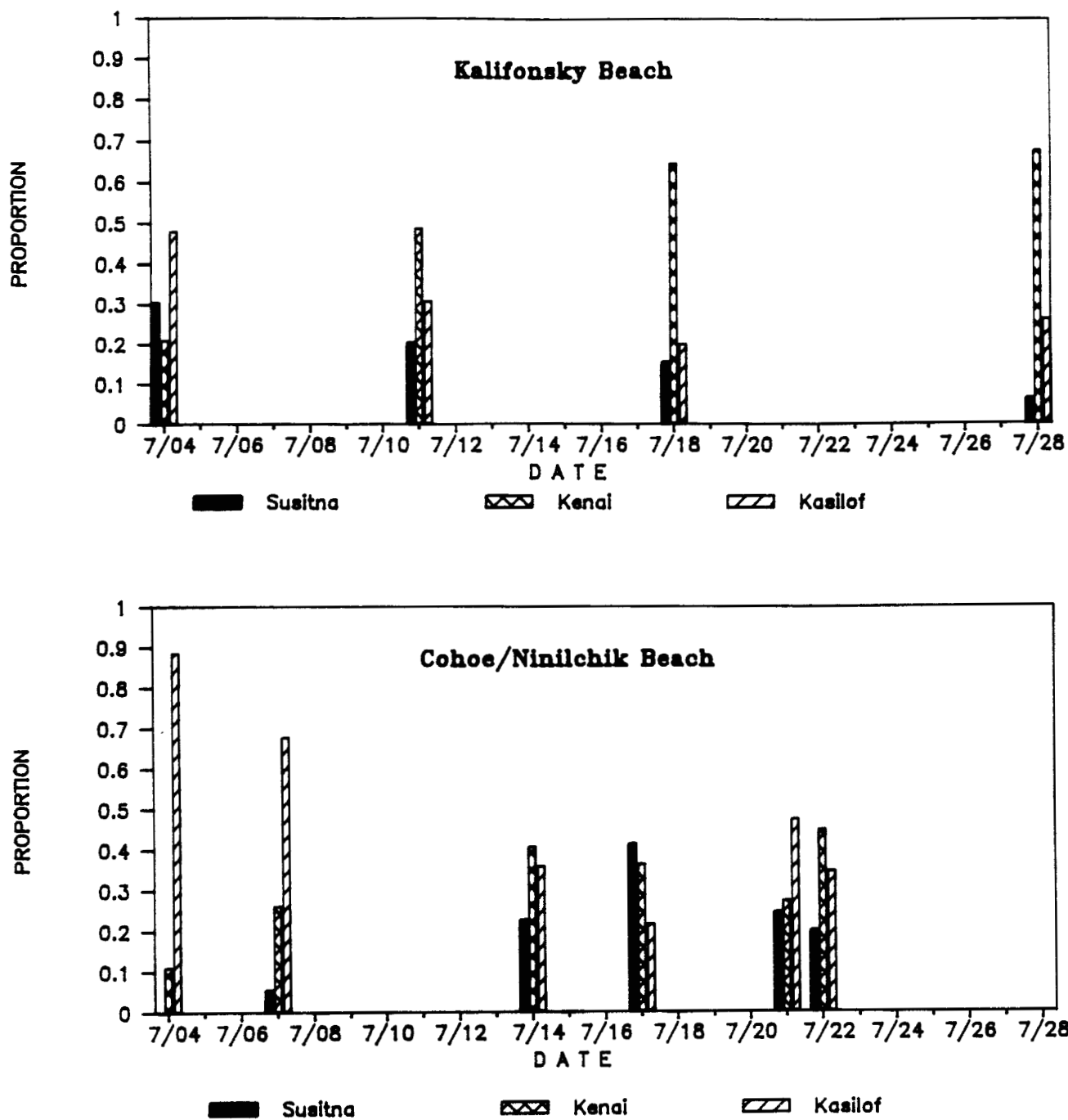
Figure 6. Stock composition estimates of age-1.3 sockeye salmon by river system derived from the Kalifonsky Beach and Cohoe/Ninilchik Beach set gill net fisheries, Upper Cook Inlet, 1986.

APPENDIX A

Appendix A.1. Ratios used for expanding other age classes relative to age-1.3 by river system, Upper Cook Inlet, 1986.

Period	Age Class	Expansion Ratio		
		Susitna	Kenai	Kasilof
6/02	0.3	0.0244	0.0329	0.0000
thru	1.2	0.3561	0.8051	0.1803
7/11	2.1	0.0065	0.0000	0.0000
	2.2	0.0846	0.2076	0.1174
	1.4	0.0033	0.0177	0.0084
	2.3	0.1268	0.4557	0.0629
	3.2	0.0000	0.0000	0.0000
	2.4	0.0000	0.0025	0.0000
7/12	0.2	0.0228	0.0025	0.0000
thru	0.3	0.0244	0.0329	0.0000
7/19	1.2	0.3561	0.8051	1.7323
	2.2	0.0846	0.2076	0.4575
	1.4	0.0030	0.0177	0.0131
	2.3	0.1268	0.4557	0.1309
	3.2	0.0000	0.0000	0.0000
	2.4	0.0000	0.0025	0.0131
7/20	0.2	0.0086	0.0025	0.0084
thru	0.3	0.0244	0.0329	0.0000
9/08	1.2	0.3561	0.8051	2.4193
	2.1	0.0065	0.0076	0.0084
	2.2	0.0846	0.2076	0.5726
	1.4	0.0033	0.0177	0.0000
	2.3	0.1268	0.4557	0.2137
	3.2	0.0000	0.0000	0.0000
	2.4	0.0000	0.0025	0.0000

Appendix A.2. Age composition of sockeye salmon harvested in the Northern District East Side set gill net fishery, Upper Cook Inlet, 1986.

| Date | Sample Size | | Age Class | | | | | | | | |
			1.1	0.3	1.2	2.1	1.3	2.2	2.3	3.2	Total
7/25	585	Percent	0.9	1.0	40.3	0.5	32.0	15.0	9.4	0.9	100.0
		Numbers	114	126	5,085	62	4,037	1,893	1,186	114	12,617
		Variance	2,431	2,699	65,581	1,356	59,314	34,754	23,214	2,431	
Totals											
Estimated		Percent	0.9	1.0	40.3	0.5	32.0	15.0	9.4	0.9	100.0
		Numbers	114	126	5,085	62	4,037	1,893	1,186	114	12,617
		Variance	2,431	2,699	65,581	1,356	59,314	34,754	23,214	2,431	
		Std. Error	49	52	256	37	244	186	152	49	
Imputed[a]		Numbers	286	318	12,802	159	10,165	4,765	2,986	286	31,767
Fishery Total		Percent	0.9	1.0	40.3	0.5	32.0	15.0	9.4	0.9	100.0
		Numbers	400	444	17,887	221	14,202	6,658	4,172	400	44,384

[a] The numbers of fish by age class represents unsampled fishing periods and were calculated as follows: for the fishing periods between 6/02-7/21 and 7/28-9/05, the age composition on 7/25 was used.

Appendix A.3. Age composition of sockeye salmon harvested in the Northern District West Side set gill net fishery, Upper Cook Inlet, 1986.

Date	Sample Size		Age Class												Total
			0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4	
7/21	589	Percent	0.5	0.2	1.9	11.9	0.3	0.0	61.8	6.8	0.2	16.1	0.3	0.0	100.0
		Numbers	91	36	346	2,170	55	0	11,268	1,240	36	2,936	55	0	18,233
		Variance	2,813	1,129	10,538	59,274	1,691	0	133,472	35,831	1,129	76,371	1,691	0	
7/25	522	Percent	0.0	0.0	1.7	10.5	0.0	0.2	67.9	4.2	0.4	14.9	0.0	0.2	100.0
		Numbers	0	0	582	3,597	0	68	23,258	1,439	137	5,104	0	68	34,253
		Variance	0	0	37,632	211,627	0	4,495	491,638	90,610	8,972	285,546	0	4,495	
Totals															
Estimated		Percent	0.2	0.1	1.8	11.0	0.1	0.1	65.8	5.1	0.3	15.3	0.1	0.1	100.0
		Numbers	91	36	928	5,767	55	68	34,526	2,679	173	8,040	55	68	52,486
		Variance	2,813	1,129	48,171	270,901	1,691	4,495	625,110	126,441	10,100	361,916	1,691	4,495	
		Std. Error	53	34	219	520	41	67	791	356	101	602	41	67	
Imputed[a]		Numbers	9	4	993	5,587	7	65	25,683	1,912	404	5,466	7	65	40,202
Fishery Total		Percent	0.1	0.0	2.1	12.2	0.1	0.1	65.0	5.0	0.6	14.6	0.1	0.1	100.0
		Numbers	100	40	1,921	11,354	62	133	60,209	4,591	577	13,506	62	133	92,688

[a] The numbers of fish by age class represents unsampled fishing periods and were calculated as follows:
1) for the fishing periods between 6/02 and 7/18, the age composition on 7/21 was used.

Appendix A.4. Age composition of sockeye salmon harvested in the Central District drift gill net fishery, Upper Cook Inlet, 1986.

Date	Sample Size		Age Class										Total
			0.1	0.2	0.3	1.2	1.3	2.2	1.4	2.3	3.2	2.4	
6/27	586	Percent	0.0	0.0	0.2	8.5	77.1	6.7	0.5	7.0	0.0	0.0	100.0
		Numbers	0	0	47	2,003	18,168	1,579	118	1,649	0	0	23,564
		Variance	0	0	1,895	73,821	167,584	59,333	4,722	61,791	0	0	
6/30	608	Percent	0.0	0.0	0.3	13.7	68.5	10.2	0.2	7.1	0.0	0.0	100.0
		Numbers	0	0	123	5,628	28,139	4,190	82	2,917	0	0	41,079
		Variance	0	0	8,315	328,687	599,863	254,641	5,549	183,369	0	0	
7/04	586	Percent	0.0	0.0	0.5	20.6	60.9	7.8	0.3	9.7	0.0	0.2	100.0
		Numbers	0	0	715	29,440	87,035	11,147	429	13,863	0	286	142,915
		Variance	0	0	173,697	5,710,676	8,313,690	2,510,876	104,428	3,058,153	0	69,688	
7/07	607	Percent	0.0	0.0	0.2	20.8	60.2	6.9	0.0	11.9	0.0	0.0	100.0
		Numbers	0	0	432	44,968	130,147	14,917	0	25,727	0	0	216,191
		Variance	0	0	153,944	12,705,481	18,479,157	4,954,518	0	8,085,846	0	0	
7/11	592	Percent	0.0	0.0	0.3	29.9	48.7	13.0	0.0	8.1	0.0	0.0	100.0
		Numbers	0	0	1,108	110,390	179,799	47,996	0	29,905	0	0	369,198
		Variance	0	0	689,839	48,341,532	57,620,567	26,085,178	0	17,168,475	0	0	

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| | | | Age Class | | | | | | | | | | |
| | | | 0.1 | 0.2 | 0.3 | 1.2 | 1.3 | 2.2 | 1.4 | 2.3 | 3.2 | 2.4 | |
Date	Sample Size												Total
7/14	581	Percent	0.0	0.0	0.9	13.2	67.4	6.4	0.2	11.7	0.2	0.0	100.0
		Numbers	0	0	3,408	49,990	255,252	24,238	757	44,309	757	0	378,712
		Variance	0	0	2,205,496	28,332,428	54,333,494	14,813,100	493,572	25,546,812	493,572	0	
7/15	634	Percent	0.2	0.0	0.6	29.2	46.1	11.5	1.4	10.7	0.0	0.3	100.0
		Numbers	159	0	478	23,253	36,711	9,158	1,115	8,521	0	239	79,633
		Variance	19,996	0	59,748	2,071,088	2,489,271	1,019,585	138,289	957,233	0	29,964	
7/18	606	Percent	0.0	0.0	1.3	15.5	57.5	8.4	0.0	17.3	0.0	0.0	100.0
		Numbers	0	0	6,510	77,622	287,953	42,066	0	86,636	0	0	500,788
		Variance	0	0	5,318,791	54,292,628	101,299,949	31,895,338	0	59,306,742	0	0	
7/19	622	Percent	0.0	0.0	0.6	20.4	51.0	12.4	0.3	15.3	0.0	0.0	100.0
		Numbers	0	0	621	21,104	52,761	12,828	310	15,828	0	0	103,452
		Variance	0	0	102,784	2,798,527	4,306,778	1,872,026	51,547	2,233,372	0	0	
7/21	607	Percent	0.0	0.0	1.5	16.8	63.2	6.8	0.2	11.5	0.0	0.0	100.0
		Numbers	0	0	4,949	55,427	208,511	22,435	660	37,941	0	0	329,923
		Variance	0	0	2,653,873	25,106,442	41,775,096	11,383,541	358,520	18,280,736	0	0	

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Date	Sample Size		Age Class 0.1	0.2	0.3	1.2	1.3	2.2	1.4	2.3	3.2	2.4	Total
7/26	605	Percent	0.0	0.0	1.2	11.7	58.1	8.1	0.7	20.2	0.0	0.0	100.0
		Numbers	0	0	2,256	21,995	109,223	15,227	1,316	37,974	0	0	187,992
		Variance	0	0	693,713	6,044,890	14,244,000	4,355,543	406,714	9,431,832	0	0	
7/28	612	Percent	0.0	0.2	3.9	13.6	56.0	5.2	0.7	20.4	0.0	0.0	100.0
		Numbers	0	333	6,487	22,620	93,143	8,649	1,164	33,931	0	0	166,327
		Variance	0	90,374	1,696,963	5,320,310	11,156,424	2,232,009	314,725	7,352,373	0	0	
							Age Class						
7/30	672	Percent	0.0	0.0	1.0	10.9	63.3	6.5	0.1	18.2	0.0	0.0	100.0
		Numbers	0	0	916	9,980	57,956	5,951	92	16,664	0	0	91,558
		Variance	0	0	123,682	1,213,317	2,902,284	759,268	12,481	1,859,922	0	0	
Totals Estimated		Percent	0.0	0.0	1.1	18.0	58.7	8.4	0.2	13.5	0.0	0.0	100.0
		Numbers	159	333	28,050	474,420	1,544,798	220,381	6,043	355,865	757	525	2,631,332
		Variance	19,996	90,374	13,882,738	192,339,825	317,688,155	102,194,957	1,890,547	153,526,655	493,572	99,652	
		Std. Error	141	301	3,726	13,869	17,824	10,109	1,375	12,391	703	316	
Imputed[a]		Numbers	0	0	1,301	17,684	85,661	10,605	191	24,790	0	0	140,231

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Date	Sample Size		0.1	0.2	0.3	1.2	1.3	2.2	1.4	2.3	3.2	2.4	Total
							Age Class						
Fishery Total		Percent	0.0	0.0	1.1	17.8	58.8	8.3	0.2	13.7	0.0	0.0	100.0
		Numbers	159	333	29,351	492,104	1,630,459	230,986	6,234	380,655	757	525	2,771,563

[a] The numbers of fish by age class represents unsampled fishing periods and were calculated as follows:
  1) for the fishing period on 7/20, the age composition on 7/19 was used.
  2) for the fishing periods between 7/31 and 9/08, the age composition on 7/30 was used.

Appendix A.5. Age composition of sockeye salmon harvested in the Central District West Side set gill net fishery, Upper Cook Inlet, 1986.

Date	Sample Size		Age Class								
			0.3	1.2	2.1	1.3	2.2	1.4	2.3	3.2	Total
6/27	481	Percent	0.2	5.4	0.0	29.7	17.9	0.4	46.4	0.0	100.0
		Numbers	6	149	0	818	493	11	1,278	0	2,755
		Variance	32	808	0	3,302	2,324	63	3,933	0	
7/04	289	Percent	1.0	9.3	0.0	25.0	20.4	0.0	44.3	0.0	100.0
		Numbers	38	358	0	963	785	0	1,706	0	3,850
		Variance	510	4,341	0	9,650	8,357	0	12,700	0	
7/11	194	Percent	0.5	7.7	0.5	21.7	19.1	0.0	49.5	1.0	100.0
		Numbers	11	166	11	468	412	0	1,067	21	2,156
		Variance	120	1,712	120	4,092	3,722	0	6,021	238	
Totals Estimated		Percent	0.6	7.7	0.1	25.7	19.3	0.1	46.2	0.3	100.0
		Numbers	55	673	11	2,249	1,690	11	4,051	21	8,761
		Variance	661	6,861	120	17,044	14,403	63	22,653	238	
		Std. Error	26	83	11	131	120	8	151	15	
Imputed[a]		Numbers	328	5,018	295	14,793	12,595	19	32,437	590	66,075

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Date	Sample Size		Age Class								Total
			0.3	1.2	2.1	1.3	2.2	1.4	2.3	3.2	
Fishery Total		Percent	0.5	7.6	0.4	22.8	19.1	0.0	48.8	0.8	100.0
		Numbers	383	5,691	306	17,042	14,285	30	36,488	611	74,836

[a] The numbers of fish by age class represents unsampled fishing periods and were calculated as follows:
   1) for the fishing periods between 6/16 and 6/30, the age composition on 6/27 was used.
   2) for the fishing period of 7/07, the age composition on 7/04 was used.
   3) for the fishing periods between 7/14 and 9/01, the age composition on 7/11 was used.

Appendix A.6. Age composition of sockeye salmon harvested in the Kalgin Island set gill net fishery, Upper Cook Inlet, 1986.

Date	Sample Size		Age Class							
			0.3	1.2	1.3	2.2	2.3	2.4	Other	Total
6/30	264	Percent	1.1	12.5	64.1	12.1	9.8	0.4	0.0	100.0
		Numbers	43	495	2,536	479	388	15	0	3,956
		Variance	647	6,508	13,693	6,329	5,260	237	0	
Totals										
Estimated		Percent	1.1	12.5	64.1	12.1	9.8	0.4	0.0	100.0
		Numbers	43	495	2,536	479	388	15	0	3,956
		Variance	647	6,508	13,693	6,329	5,260	237	0	
		Std. Error	25	81	117	80	73	15	0	
Imputed[a]		Numbers	727	7,318	35,021	4,178	9,593	19	131	56,987
Fishery Total		Percent	1.3	12.8	61.6	7.6	16.4	0.1	0.2	100.0
		Numbers	770	7,813	37,557	4,657	9,981	34	131	60,943

[a] The numbers of fish by age class represents unsampled fishing periods and were calculated as follows:
1) for the fishing periods of 6/16 and 6/27, the age composition on 6/30 was used.
2) for the fishing periods between 7/04 and 9/08, the age composition of corresponding drift fishery periods was used.

Appendix A.7. Age composition of sockeye salmon harvested in the Salamatof Beach set gill net fishery, Upper Cook Inlet, 1986.

Date	Sample Size		Age Class							Total
			0.2	0.3	1.2	1.3	2.2	1.4	2.3	
7/26	621	Percent	0.2	2.3	13.0	55.0	7.4	0.5	21.6	100.0
		Numbers	127	1,445	8,166	34,549	4,648	314	13,568	62,817
		Variance	12,704	143,016	719,822	1,575,208	436,119	31,663	1,077,786	
7/30	607	Percent	0.0	0.2	18.5	51.3	9.1	0.3	20.6	100.0
		Numbers	0	45	4,177	11,584	2,055	68	4,652	22,581
		Variance	0	1,680	126,865	210,213	69,602	2,517	137,626	
Totals										
Estimated		Percent	0.1	1.7	14.5	54.0	7.8	0.4	21.3	100.0
		Numbers	127	1,490	12,343	46,133	6,703	382	18,220	85,398
		Variance	12,704	144,696	846,688	1,785,421	505,721	34,180	1,215,412	
		Std. Error	113	380	920	1,336	711	185	1,102	
Imputed[a]		Numbers	198	2,424	26,282	91,656	13,924	713	36,324	171,521
Fishery Total		Percent	0.1	1.5	15.0	53.6	8.0	0.4	21.2	100.0
		Numbers	325	3,914	38,625	137,789	20,627	1,095	54,544	256,919

[a] The numbers of fish by age class represents unsampled fishing periods and were calculated as follows:
1) for the fishing periods between 7/04 and 7/27, the age composition on 7/26 was used.

Appendix A.8. Age composition of sockeye salmon harvested in the Kalifonsky Beach set gill net fishery, Upper Cook Inlet, 1986.

Date	Sample Size		Age Class								
			0.2	0.3	1.2	1.3	2.2	1.4	2.3	2.4	Total
7/04	557	Percent	0.0	0.0	31.8	51.6	11.5	0.4	4.7	0.0	100.0
		Numbers	0	0	564	917	204	6	83	0	1,774
		Variance	0	0	1,228	1,413	576	23	254	0	
7/11	569	Percent	0.2	0.0	44.6	23.9	21.6	1.6	7.6	0.5	100.0
		Numbers	5	0	928	497	449	33	158	10	2,080
		Variance	15	0	1,882	1,385	1,290	120	535	38	
7/18	613	Percent	0.0	0.2	38.0	37.5	12.9	0.0	11.4	0.0	100.0
		Numbers	0	99	18,922	18,673	6,423	0	5,677	0	49,794
		Variance	0	8,087	954,504	949,541	455,209	0	409,205	0	
7/28	623	Percent	0.0	0.6	41.0	30.8	15.4	0.3	11.9	0.0	100.0
		Numbers	0	48	3,266	2,454	1,227	23	948	0	7,966
		Variance	0	609	24,679	21,744	13,292	305	10,696	0	

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Date	Sample Size		Age Class								
			0.2	0.3	1.2	1.3	2.2	1.4	2.3	2.4	Total
Totals											
Estimated		Percent	0.0	0.2	38.4	36.6	13.5	0.1	11.1	0.0	100.0
		Numbers	5	147	23,680	22,541	8,303	62	6,866	10	61,614
		Variance	15	8,695	982,293	974,085	470,366	448	420,689	38	
		Std. Error	4	93	991	987	686	21	649	6	
Imputed[a]		Numbers	122	1,424	172,725	142,444	65,180	1,516	47,357	304	431,072
Fishery Total		Percent	0.0	0.3	39.9	33.5	14.9	0.3	11.0	0.1	100.0
		Numbers	127	1,571	196,405	164,985	73,483	1,578	54,223	314	492,686

[a] The numbers of fish by age class represents unsampled fishing periods and were calculated as follows:
1) for the fishing periods 7/03 and 7/07, the age composition on 7/04 was used.
2) for the fishing periods 7/13 and 7/14, the age composition on 7/11 was used.
3) for the fishing periods of 7/15, 7/17 and 7/19 through 7/22, the age composition on 7/18 was used.
4) for the fishing periods of 7/25-27 and 7/30 through 8/15, the age composition on 7/28 was used.

Appendix A.9. Age composition of sockeye salmon harvested in the Cohoe/Ninilchik Beach set gill net fishery, Upper Cook Inlet, 1986.

Date	Sample Size		0.2	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4	Total
7/04	576	Percent	0.2	0.2	27.4	0.2	0.0	53.7	13.4	0.2	4.5	0.0	0.2	100.0
		Numbers	23	23	3,175	23	0	6,222	1,553	23	521	0	23	11,586
		Variance	466	466	46,439	466	0	58,044	27,091	466	10,033	0	466	
7/07	553	Percent	0.0	0.4	41.0	0.0	0.2	33.4	17.0	1.8	5.8	0.0	0.4	100.0
		Numbers	0	90	9,202	0	45	7,496	3,815	404	1,302	0	90	22,444
		Variance	0	3,636	220,748	0	1,822	202,994	128,762	16,130	49,859	0	3,636	
7/14	577	Percent	0.0	0.3	44.7	0.0	0.0	29.4	15.6	2.4	7.3	0.0	0.3	100.0
		Numbers	0	331	49,280	0	0	32,413	17,199	2,646	8,048	0	331	110,247
		Variance	0	63,114	5,216,074	0	0	4,379,889	2,778,294	494,279	1,427,952	0	63,114	
7/17	636	Percent	0.0	0.3	39.5	0.0	0.0	32.5	17.3	0.2	10.2	0.0	0.0	100.0
		Numbers	0	156	20,551	0	0	16,909	9,001	104	5,307	0	0	52,028
		Variance	0	12,750	1,018,716	0	0	935,164	609,891	8,509	390,460	0	0	
7/21	623	Percent	0.0	0.3	41.7	0.2	0.0	25.3	22.5	0.0	10.0	0.0	0.0	100.0
		Numbers	0	172	23,891	115	0	14,495	12,891	0	5,729	0	0	57,293
		Variance	0	15,784	1,282,973	10,534	0	997,364	920,231	0	474,958	0	0	
7/22	621	Percent	0.0	0.5	42.0	0.0	0.0	31.8	15.8	0.2	9.3	0.2	0.2	100.0
		Numbers	0	196	16,449	0	0	12,454	6,188	78	3,642	78	78	39,164
		Variance	0	12,308	602,642	0	0	536,530	329,118	4,938	208,676	4,938	4,938	

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Total Estimated	Percent	0.0	0.3	41.9	0.0	0.0	30.7	17.3	1.1	8.4	0.0	0.2	100.0
	Numbers	23	968	122,548	138	45	89,989	50,647	3,255	24,549	78	522	292,762
	Variance	466	108,058	8,387,592	11,000	1,822	7,109,984	4,793,387	524,322	2,561,938	4,938	72,154	
	Std. Error	22	329	2,896	105	43	2,666	2,189	724	1,601	70	269	
Imputed[a]	Numbers	39	2,562	258,125	39	179	208,370	103,913	3,205	56,344	589	1,055	634,420
Fishery Total	Percent	0.0	0.4	41.1	0.0	0.0	32.2	16.7	0.7	8.7	0.1	0.2	100.0
	Numbers	62	3,530	380,673	177	224	298,359	154,560	6,460	80,893	667	1,577	927,182

[a] The numbers of fish by age class represents unsampled fishing periods and were calculated as follows:
1) for the fishing period of 7/03, the age composition on 7/04 was used.
2) for the fishing periods between 7/11 and 7/13, the age composition on 7/07 was used.
3) for the fishing period of 7/15, the age composition on 7/14 was used.
4) for the fishing periods between 7/18 and 7/20, the age composition on 7/17 was used.
5) for the fishing periods between 7/25 and 8/15, the age composition on 7/22 was used.

Appendix A.10. Estimated mean length by sex and age class of sockeye salmon harvested in the commercial fisheries of Upper Cook Inlet, 1986.

| | | | 1983 | | 1982 | | | 1981 | | | 1980 | | | 1979 |
			0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4
Northern District East Side	Males	Mean Length[b]				496.5			566.9	521.9		580.9		
		Std. Error				6.3			6.9	15.5		7.6		
		Sample size				21			37	7		11		
	Females	Mean Length			557.7	484.3			553.2	517.7		545.3	491.5	
		Std. Error			13.4	6.0			4.5	11.3		9.8	8.5	
		Sample Size			3	39			34	12		12	2	
	All Fish	Mean Length			557.7	488.6			560.4	519.2		562.4	491.5	
		Std. Error			13.4	4.5			4.2	9.2		6.3	8.5	
		Sample Size			3	60			71	19		23	2	

Brood Year and Age Class

Location[a]   Sex

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			1983		1982			1981			1980			1979
									Brood Year and Age Class					
Location[a]	Sex		0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4
Northern District West Side	Males	Mean Length	484.0		524.0	483.0			571.0	501.3	579.5	574.4	533.0	
		Std. Error	0.0		22.5	6.2			3.1	10.9	4.5	4.4	0.0	
		Sample size	1		3	38			113	10	2	29	1	
	Females	Mean Length			569.6	490.1			558.4	498.4	555.0	556.4		
		Std. Error			4.6	5.5			2.1	5.9	0.0	3.2		
		Sample Size			8	19			116	12	1	38		
	All Fish	Mean Length	484.0		556.6	485.3			564.6	499.7	570.3	564.2	533.0	
		Std. Error	0.0		7.0	4.5			1.9	5.9	3.0	2.6	0.0	
		Sample Size	1		11	57			229	22	3	67	1	

-Continued-

			1983		1982			1981			1980			1979
														Brood Year and Age Class
Location[a]	Sex		0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4
Central District Drift	Males	Mean Length			571.7	499.2			561.8	505.0	533.5	579.6		623.0
		Std. Error			19.9	2.0			1.5	3.3	23.5	2.9		5.0
		Sample Size			7	221			565	84	4	124		2
	Females	Mean Length	565.0		563.7	495.7			555.8	516.1	592.3	558.8		
		Std. Error	0.0		7.8	2.5			1.1	5.4	16.7	2.6		
		Sample Size	1		10	96			500	48	3	118		
	All Fish	Mean Length	565.0		566.9	498.2			559.0	509.1	562.9	569.5		623.0
		Std. Error	0.0		9.4	1.6			0.9	2.9	15.2	2.0		5.0
		Sample Size	1		17	317			1065	132	7	242		2

-Continued-

			Brood Year and Age Class											
			1983		1982			1981			1980			1979
Location[a]	Sex		0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4
Central District West Side	Males	Mean Length			550.0	497.0	376.0		559.4	500.3		557.5		
		Std. Error			0.0	6.5	0.0		4.0	5.2		4.1		
		Sample Size			1	21	1		37	39		62		
	Females	Mean Length			553.0	469.5			551.6	495.1	525.0	545.5	489.0	
		Std. Error			12.0	11.4			2.3	4.4	0.0	1.9	0.0	
		Sample Size			2	10			64	48	1	111	1	
	All Fish	Mean Length			551.9	488.2	376.0		554.5	497.4	525.0	549.8	489.0	
		Std. Error			8.0	5.7	0.0		2.1	3.4	0.0	1.9	0.0	
		Sample Size			3	31	1		101	87	1	173	1	

-Continued-

Location[a]	Sex		1983		1982			1981			1980			1979
			0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4
Kalgin Island	Males	Mean Length			559.0	477.3			542.3	513.1		552.8		
		Std. Error			22.5	6.6			3.1	15.1		6.4		
		Sample Size			3	16			63	11		10		
	Females	Mean Length			545.0	502.0			543.6	511.0		546.4		
		Std. Error			0.0	11.7			3.5	5.8		13.7		
		Sample Size			1	5			43	10		7		
	All Fish	Mean Length			555.5	483.2			542.8	512.1		550.2		
		Std. Error			16.9	5.7			2.3	8.4		6.8		
		Sample Size			4	21			106	21		17		

Brood Year and Age Class

-Continued-

Location[a]	Sex		1983		1982			1981			1980			1979
			0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4
Salamatof Beach	Males	Mean Length			596.8	506.8			577.0	519.8		584.1		
		Std. Error			5.1	4.4			2.8	9.6		6.1		
		Sample Size			4	57			103	20		34		
	Females	Mean Length	562.0		553.0	499.7			561.9	515.0	607.0	562.2		
		Std. Error	0.0		0.0	4.6			2.2	8.2	8.0	4.0		
		Sample Size	1		1	38			118	25	2	49		
	All Fish	Mean Length	562.0		588.8	504.0			568.9	517.1	607.0	571.2		
		Std. Error	0.0		4.1	3.2			1.7	6.2	8.0	3.4		
		Sample Size	1		5	95			221	45	2	83		

-Continued-

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Location[a]	Sex		1983		1982			1981			1980			1979
			0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4
Kalifonsky Beach	Males	Mean Length	414.0			486.7			551.6	489.1	574.7	552.9		
		Std. Error	0.0			4.1			4.5	5.8	11.9	12.0		
		Sample Size	1			94			76	39	3	20		
	Females	Mean Length			547.0	476.3			542.6	481.5	567.0	554.4		553.0
		Std. Error			0.0	3.1			3.1	3.6	2.6	9.7		0.0
		Sample Size			1	111			104	49	3	17		1
	All Fish	Mean Length	414.0		547.0	481.1			546.4	484.9	570.8	553.6		553.0
		Std. Error	0.0		0.0	2.5			2.6	3.2	6.1	7.9		0.0
		Sample Size	1		1	205			180	88	6	37		1

Brood Year and Age Class

-Continued-

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Location[a]	Sex		1983 0.2	1.1	1982 0.3	1.2	2.1	1981 0.4	1.3	2.2	1980 1.4	2.3	3.2	1979 2.4
Brood Year and Age Class														
Cohoe/Ninilchik Beach	Males	Mean Length			572.0	485.7			542.5	485.1	483.0	550.7		
		Std. Error			1.0	1.9			2.8	2.2	5.0	7.4		
		Sample Size			2	195			157	79	2	24		
	Females	Mean Length				484.3			541.9	494.9	527.0	549.3		562.0
		Std. Error				2.2			2.3	3.8	0.0	5.3		0.0
		Sample Size				128			147	67	1	24		1
	All Fish	Mean Length			572.0	485.1			542.2	489.6	497.7	550.0		562.0
		Std. Error			1.0	1.5			1.8	2.1	3.3	4.6		0.0
		Sample Size			2	323			304	146	3	48		1

Source: Length information summarized from the original age-weight-length data forms.
[a] Location and dates inclusive of the sample statistic (mean length):
　Northern District East Side set - 7/25.
　Northern District West Side set - 7/21, 7/25.
　Central District Drift - 6/27, 6/30, 7/04, 7/07, 7/11, 7/14, 7/15, 7/18, 7/19, 7/21, 7/26, 7/28, 7/30.
　Central District West Side set - 6/27, 7/04, 7/11.
　Kalgin Island - 6/30.
　Salamatof Beach - 7/26, 7/30.
　Kalifonsky Beach - 7/04, 7/11, 7/18, 7/28.
　Cohoe/Ninilchik Beach - 7/04, 7/07, 7/14, 7/17, 7/21, 7/22.

Appendix A.11. Estimated mean weight by sex and age class of sockeye salmon harvested in the commercial fisheries of Upper Cook Inlet, 1986.

			Brood Year and Age Class												
			1983		1982			1981			1980			1979
Location[a]	Sex		0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4
Northern District East Side	Males	Mean Weight[b]				2.0			3.2	2.3		3.4		
		Std. Error				0.2			0.1	0.3		0.1		
		Sample size				11			23	5		8		
	Females	Mean Weight			2.9	1.6			2.6	2.1		2.5	1.8	
		Std. Error			0.1	0.1			0.1	0.2		0.2	0.0	
		Sample Size			2	6			23	6		7	1	
	All Fish	Mean Weight			2.9	1.7			2.9	2.2		3.0	1.8	
		Std. Error			0.1	0.1			0.1	0.2		0.1	0.0	
		Sample Size			2	17			46	11		15	1	

-Continued-

			|— 1983 —|		|—— 1982 ——|			|—— 1981 ——|		|—— 1980 ——|			1979
Location[a]	Sex		0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4
Northern District West Side	Males	Mean Weight			2.0	1.7			2.9	2.2	3.3			
		Std. Error			0.0	0.1			0.3	0.0	0.2			
		Sample size			1	14			9	1	2			
	Females	Mean Weight			2.9	1.7			2.9	1.8		2.5		
		Std. Error			0.3	0.2			0.1	0.1		0.3		
		Sample Size			2	6			10	3		4		
	All Fish	Mean Weight			2.6	1.7			2.9	2.0	3.3	2.5		
		Std. Error			0.2	0.1			0.1	0.1	0.2	0.3		
		Sample Size			3	20			19	4	2	4		

Brood Year and Age Class

-Continued-

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Location[a]	Sex		Brood Year and Age Class											
			1983		1982			1981			1980			1979
			0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4
Central District Drift	Males	Mean Weight			3.2	2.1			3.0	2.0	2.1	3.3		4.2
		Std. Error			0.6	0.0			0.0	0.1	0.5	0.1		0.0
		Sample Size			3	111			277	40	2	61		1
	Females	Mean Weight			2.6	1.9			2.8	2.1	3.8	2.8		
		Std. Error			0.1	0.1			0.0	0.1	0.0	0.1		
		Sample Size			4	52			262	24	1	64		
	All Fish	Mean Weight			2.9	2.0			2.9	2.1	3.0	3.0		4.2
		Std. Error			0.3	0.0			0.0	0.1	0.4	0.1		0.0
		Sample Size			7	163			539	64	3	125		1

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			\multicolumn{14}{c}{Brood Year and Age Class}

			1983		1982			1981			1980			1979
Location[a]	Sex		0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4
Central District West Side	Males	Mean Weight			2.7	2.2	0.9		2.9	2.2		3.0		
		Std. Error			0.0	0.1	0.0		0.1	0.1		0.1		
		Sample Size			1	10	1		22	19		27		
	Females	Mean Weight			2.3	1.8			2.7	1.9	2.4	2.6		
		Std. Error			0.0	0.0			0.1	0.1	0.0	0.1		
		Sample Size			1	3			40	25	1	61		
	All Fish	Mean Weight			2.5	2.0	0.9		2.8	2.0	2.4	2.7		
		Std. Error			0.0	0.1	0.0		0.1	0.1	0.0	0.1		
		Sample Size			2	13	1		62	44	1	88		

-Continued-

			Brood Year and Age Class										
			1983		1982			1981			1980			1979
Location[a]	Sex		0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4
Kalgin Island	Males	Mean Weight			2.3	1.9			2.7	2.2		2.8		
		Std. Error			0.2	0.2			0.1	0.1		0.1		
		Sample Size			2	5			39	5		5		
	Females	Mean Weight				2.2			2.7	2.1		2.4		
		Std. Error				0.4			0.1	0.2		0.1		
		Sample Size				2			19	4		3		
	All Fish	Mean Weight			2.3	1.9			2.7	2.1		2.6		
		Std. Error			0.2	0.2			0.1	0.1		0.1		
		Sample Size			2	7			58	9		8		

-Continued-

Location[a]	Sex		Brood Year and Age Class											
			1983		1982			1981			1980			1979
			0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4
Salamatof Beach	Males	Mean Weight				2.0			3.4	2.4		3.4		
		Std. Error				0.1			0.1	0.2		0.2		
		Sample Size				32			44	13		17		
	Females	Mean Weight				1.9			2.9	1.8	3.7	2.8		
		Std. Error				0.1			0.1	0.1	0.4	0.1		
		Sample Size				22			37	16	2	22		
	All Fish	Mean Weight				2.0			3.1	2.1	3.7	3.1		
		Std. Error				0.1			0.1	0.1	0.4	0.1		
		Sample Size				54			81	29	2	39		

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			Brood Year and Age Class												
			1983		1982			1981			1980			1979
Location[a]	Sex		0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4
Kalifonsky Beach	Males	Mean Weight	1.1			1.7			2.8	1.9		2.9		
		Std. Error	0.0			0.1			0.1	0.1		0.2		
		Sample Size	1			62			35	18		10		
	Females	Mean Weight				1.7			2.4	1.5		3.0		2.9
		Std. Error				0.1			0.1	0.0		0.2		0.0
		Sample Size				53			51	25		6		1
	All Fish	Mean Weight	1.1			1.7			2.6	1.7		2.9		2.9
		Std. Error	0.0			0.0			0.1	0.0		0.2		0.0
		Sample Size	1			115			86	43		16		1

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| | | | 1983 | | 1982 | | | 1981 | | | 1980 | | | 1979 |
| | | | 0.2 | 1.1 | 0.3 | 1.2 | 2.1 | 0.4 | 1.3 | 2.2 | 1.4 | 2.3 | 3.2 | 2.4 |
Location[a]	Sex														
Cohoe/Ninilchik Beach	Males	Mean Weight				1.8			2.7	1.9		2.4		
		Std. Error				0.0			0.1	0.1		0.2		
		Sample Size				81			68	36		9		
	Females	Mean Weight				1.8			2.5	1.9	2.0	2.6		
		Std. Error				0.0			0.1	0.1	0.0	0.2		
		Sample Size				58			60	23	1	12		
	All Fish	Mean Weight				1.8			2.6	1.9	2.0	2.5		
		Std. Error				0.0			0.1	0.0	0.0	0.1		
		Sample Size				139			128	59	1	21		

Source: Weight information summarized from the original age-weight-length data forms.
[a] Location and dates inclusive of the sample statistic (mean weight):
  Northern District East Side set - 7/25.
  Northern District West Side set - 7/21, 7/25.
  Central District Drift - 6/27, 6/30, 7/04, 7/07, 7/11, 7/14, 7/15, 7/18, 7/19, 7/21, 7/26, 7/28, 7/30.
  Central District West Side set - 6/27, 7/04, 7/11.
  Kalgin Island - 6/30.

APPENDIX B

Appendix B.1. Stock composition of sockeye salmon commercial catches by age class and date for the Northern District set gill net fisheries, Upper Cook Inlet, 1986.

| | | Age Class[b] | | | | | | | | | | | | | | | | |
| | | 0.3 | | 1.2 | | 2.1 | | 1.3 | | 2.2 | | 1.4 | | 2.3 | | Other | | Total | |
Date	System	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
Northern District East Side[a]																			
6/2	Susitna	85.3	379	77.7	13,898	100.0	222	88.7	12,597	76.2	5,073	0.0	0	68.6	2,861	0.0	0	78.9	35,031
thru	Kenai	14.7	65	22.3	3,989	0.0	0	11.3	1,605	23.8	1,585	0.0	0	31.4	1,310	0.0	0	19.3	8,554
9/08	Kasilof	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	Unknown	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	100.0	800	1.8	800
	Total	100.0	444	100.0	17,887	100.0	222	100.0	14,202	100.0	6,658	0.0	0	100.0	4,172	100.0	800	100.0	44,384
Northern District West Side[c]																			
6/2	Susitna	100.0	782	100.0	4,319	100.0	61	100.0	14,724	100.0	1,778	100.0	309	100.0	3,524	100.0	201	100.0	25,698
thru	Kenai	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
7/21	Kasilof	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	Total	100.0	782	100.0	4,319	100.0	61	100.0	14,724	100.0	1,778	100.0	309	100.0	3,524	100.0	201	100.0	25,698

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Appendix B.1. (p 2 of 2)

| | | 0.3 | | 1.2 | | 2.1 | | 1.3 | | 2.2 | | 1.4 | | 2.3 | | Other | | Total | |
Date	System	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
7/25	Susitna	100.0	1,139	100.0	7,035	100.0	0	100.0	45,485	100.0	2,813	100.0	268	100.0	9,982	100.0	268	100.0	66,990
thru	Kenai	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
9/08	Kasilof	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	Total	100.0	1,139	100.0	7,035	0.0	0	100.0	45,485	100.0	2,813	100.0	268	100.0	9,982	100.0	268	100.0	66,990
Total	Susitna	100.0	1,921	100.0	11,354	100.0	61	100.0	60,209	100.0	4,591	100.0	577	100.0	13,506	100.0	469	100.0	92,688
	Kenai	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	Kasilof	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	Total	100.0	1,921	100.0	11,354	0.0	61	100.0	60,209	100.0	4,591	100.0	577	100.0	13,506	100.0	469	100.0	92,688

[a] Stock composition of age 1.3 based on sample taken on 7/25.
[b] The values shown in this table include estimated and imputed quantities.
[c] Stock composition of age 1.3 based on sample taken on 7/21.

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Appendix B.2. Stock composition of sockeye salmon commercial catches by age class and date for the Central District drift gill net fishery, Upper Cook Inlet, 1986.

		Age Class[a,b]														
		0.2		0.3		1.2		1.3		2.2		1.4		2.3		Total	
Date	System	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
6/27	Susitna	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	Kenai	0.0	0	0.0	47	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.2	47
	Kasilof	0.0	0	0.0	0	100.0	2,003	100.0	18,168	100.0	1,579	100.0	118	100.0	1,649	99.8	23,517
	Total	0.0	0	0.0	47	100.0	2,003	100.0	18,168	100.0	1,579	100.0	118	100.0	1,649	100.0	23,564
6/30	Susitna	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	Kenai	0.0	0	100.0	123	16.7	940	4.3	1,210	7.3	306	8.6	7	24.6	718	8.0	3,303
	Kasilof	0.0	0	0.0	0	83.3	4,688	95.7	26,929	92.7	3,884	91.4	75	75.4	2,199	92.0	37,776
	Total	0.0	0	100.0	123	100.0	5,628	100.0	28,139	100.0	4,190	100.0	82	100.0	2,917	100.0	41,079
7/04	Susitna	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	Kenai	0.0	0	100.0	715	53.4	15,721	13.0	11,315	20.9	2,330	24.0	103	48.0	6,654	25.8	36,837
	Kasilof	0.0	0	0.0	0	46.6	13,719	87.0	75,720	79.1	8,817	76.0	326	52.0	7,209	74.0	105,792
	Unknown	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.2	286
	Total	0.0	0	100.0	715	100.0	29,440	100.0	87,035	100.0	11,147	100.0	429	100.0	13,863	100.0	142,915

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		\multicolumn{16}{c}{Age Class[a,b]}
		0.2		0.3		1.2		1.3		2.2		1.4		2.3		Total	
Date	System	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
7/07	Susitna	0.0	0	0.0	0	9.1	4,092	13.4	17,440	7.6	1,134	0.0	0	7.4	1,904	11.4	24,569
	Kenai	0.0	0	100.0	432	62.1	27,925	40.3	52,449	56.0	8,354	0.0	0	79.9	20,556	50.7	109,716
	Kasilof	0.0	0	0.0	0	28.8	12,951	46.3	60,258	36.4	5,430	0.0	0	12.7	3,267	37.9	81,906
	Total	0.0	0	100.0	432	100.0	44,968	100.0	130,147	100.0	14,917	0.0	0	100.0	25,727	100.0	216,191
7/11	Susitna	0.0	0	0.0	0	5.6	6,182	7.1	12,766	3.9	1,872	0.0	0	4.0	1,196	6.0	22,016
	Kenai	0.0	0	100.0	1,108	73.6	81,247	41.1	73,897	56.1	26,926	0.0	0	81.8	24,462	56.2	207,640
	Kasilof	0.0	0	0.0	0	20.8	22,961	51.8	93,136	40.0	19,198	0.0	0	14.2	4,247	37.8	139,542
	Total	0.0	0	100.0	1,108	100.0	110,390	100.0	179,799	100.0	47,996	0.0	0	100.0	29,905	100.0	369,198
7/14	Susitna	0.0	0	19.9	678	6.3	3,149	17.7	45,180	5.8	1,406	4.2	32	7.4	3,279	14.2	53,724
	Kenai	0.0	0	80.1	2,730	42.5	21,246	52.8	134,773	42.2	10,228	67.8	513	79.8	35,359	54.1	204,849
	Kasilof	0.0	0	0.0	0	51.2	25,595	29.5	75,299	52.0	12,604	28.0	212	12.8	5,672	31.5	119,381
	Unknown	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.2	758
	Total	0.0	0	100.0	3,408	100.0	49,990	100.0	255,252	100.0	24,238	100.0	757	100.0	44,309	100.0	378,712

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		Age Class[a,b]														
		0.2		0.3		1.2		1.3		2.2		1.4		2.3		Total	
Date	System	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
7/15	Susitna	0.0	0	3.3	16	0.9	209	2.9	1,065	0.8	73	0.6	7	1.1	94	1.8	1,463
	Kenai	0.0	0	96.7	462	47.0	10,929	64.1	23,532	46.5	4,258	72.0	803	86.2	7,345	59.4	47,329
	Kasilof	0.0	0	0.0	0	52.1	12,115	33.0	12,115	52.7	4,826	27.4	306	12.7	1,082	38.2	30,443
	Unknown	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.5	397
	Total	0.0	0	100.0	478	100.0	23,253	100.0	36,711	100.0	9,158	100.0	1,115	100.0	8,521	100.0	79,633
7/18	Susitna	0.0	0	23.5	1,530	5.2	4,036	16.5	47,512	4.7	1,977	0.0	0	8.1	7,018	12.4	62,073
	Kenai	0.0	0	76.5	4,980	28.4	22,045	39.9	114,893	28.1	11,821	0.0	0	70.1	60,732	42.8	214,470
	Kasilof	0.0	0	0.0	0	66.4	51,541	43.6	125,548	67.2	28,268	0.0	0	21.8	18,887	44.8	224,244
	Total	0.0	0	100.0	6,510	100.0	77,622	100.0	287,953	100.0	42,066	0.0	0	100.0	86,636	100.0	500,787
7/19	Susitna	0.0	0	2.9	22	0.6	158	2.4	1,575	0.5	80	0.8	3	0.8	158	1.6	1,996
thru	Kenai	0.0	0	97.1	750	33.1	8,690	58.6	38,464	35.1	5,602	99.2	383	75.6	14,886	53.4	68,774
7/20	Kasilof	0.0	0	0.0	0	66.3	17,406	39.0	25,599	64.4	10,278	0.0	0	23.6	4,647	45.0	57,930
	Total	0.0	0	100.0	772	100.0	26,254	100.0	65,638	100.0	15,959	100.0	386	100.0	19,691	100.0	128,700

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Date	System	0.2 %	0.2 Number	0.3 %	0.3 Number	1.2 %	1.2 Number	1.3 %	1.3 Number	2.2 %	2.2 Number	1.4 %	1.4 Number	2.3 %	2.3 Number	Total %	Total Number
7/21	Susitna	0.0	0	24.3	1,203	5.8	3,215	20.3	42,328	5.7	1,279	7.5	50	8.3	3,149	15.5	51,223
	Kenai	0.0	0	75.7	3,746	30.4	16,850	46.9	97,792	32.2	7,224	92.5	611	69.4	26,331	46.2	152,553
	Kasilof	0.0	0	0.0	0	63.8	35,362	32.8	68,392	62.1	13,932	0.0	0	22.6	8,575	38.3	126,261
	Total	0.0	0	100.0	4,949	100.0	55,427	100.0	208,511	100.0	22,435	100.0	660	100.3	37,941	100.0	329,923
7/26	Susitna	0.0	0	25.5	575	11.6	2,551	28.0	30,582	11.1	1,690	7.9	104	10.6	4,025	21.0	39,529
	Kenai	0.0	0	74.5	1,681	56.9	12,515	60.8	66,408	59.0	8,984	92.1	1,212	82.3	31,253	64.9	122,052
	Kasilof	0.0	0	0.0	0	31.5	6,928	11.2	12,233	29.9	4,553	0.0	0	7.1	2,696	14.0	26,410
	Total	0.0	0	100.0	2,256	100.0	21,995	100.0	109,223	100.0	15,227	100.0	1,316	100.0	37,974	100.0	187,991
7/28	Susitna	61.6	205	33.0	2,141	17.6	3,981	37.1	34,556	16.7	1,444	11.0	128	14.9	5,056	28.6	47,511
	Kenai	27.0	90	67.0	4,346	59.9	13,549	55.9	52,067	61.9	5,354	89.0	1,036	80.4	27,281	62.4	103,723
	Kasilof	11.4	38	0.0	0	22.5	5,090	7.0	6,520	21.4	1,851	0.0	0	4.7	1,595	9.1	15,093
	Total	100.0	333	100.0	6,487	100.0	22,620	100.0	93,143	100.0	8,649	100.0	1,164	100.0	33,931	100.0	166,327

Age Class[a,b]

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Date	System	Age Class[a,b]														
		0.2		0.3		1.2		1.3		2.2		1.4		2.3		Total	
		%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
7/30	Susitna	0.0	0	16.7	345	8.4	1,891	19.7	25,756	7.9	1,061	4.8	10	6.7	2,519	15.3	31,581
thru	Kenai	0.0	0	83.3	1,721	70.7	15,917	73.1	95,572	72.4	9,720	95.2	197	89.2	33,531	75.8	156,657
9/08	Kasilof	0.0	0	0.0	0	20.9	4,705	7.2	9,413	19.7	2,645	0.0	0	4.1	1,541	8.9	18,305
	Total	0.0	0	100.0	2,066	100.0	22,513	100.0	130,741	100.0	13,425	100.0	207	100.0	37,591	100.0	206,543
Total	Susitna	61.6	205	22.2	6,510	6.0	29,465	15.9	258,759	5.2	12,015	5.3	333	7.5	28,549	12.1	335,836
	Kenai	27.0	90	77.8	22,841	50.3	247,573	46.8	762,371	43.8	101,105	78.0	4,865	75.9	288,917	51.5	1,427,762
	Kasilof	11.4	38	0.0	0	43.7	215,065	37.4	609,330	51.0	117,865	16.6	1,036	16.6	63,265	36.3	1,006,524
	Unknown	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.1	1,441
	Total	100.0	333	100.0	29,351	100.0	492,103	100.0	1,630,460	100.0	230,986	100.0	6,234	100.0	380,655	100.0	2,771,563

[a] Age class totals may differ slightly from original age class totals due to rounding error.
[b] The values shown in this table include estimated and imputed quantities.

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Appendix B.3. Stock composition of sockeye salmon commercial catches by age class and date for the Kalgin Island set gill net fishery, Upper Cook Inlet, 1986.

Date	System	Age Class[a,b]															
		0.2		0.3		1.2		1.3		2.2		1.4		2.3		Total	
		%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
6/16	Susitna	0.0	0	37.6	33	3.7	37	17.7	908	11.6	113	0.0	0	15.0	118	15.1	1,209
thru	Kenai	0.0	0	62.4	55	89.6	898	19.2	985	30.9	300	0.0	0	58.5	460	33.7	2,698
6/30	Kasilof	0.0	0	0.0	0	6.7	67	63.1	3,238	57.5	558	0.0	0	26.5	208	50.8	4,071
	Total	0.0	0	100.0	88	100.0	1,002	100.0	5,132	100.0	970	0.0	0	100.0	786	100.0	8,012
7/04	Susitna	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	Kenai	0.0	0	100.0	6	40.1	93	13.0	89	20.9	18	0.0	0	52.0	57	23.4	262
	Kasilof	0.0	0	0.0	0	59.9	138	87.0	592	79.1	69	0.0	0	48.0	52	76.1	852
	Unknown	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.4	5
	Total	0.0	0	100.0	6	100.0	231	100.0	681	100.0	87	0.0	0	100.0	109	100.0	1,119
7/07	Susitna	0.0	0	19.9	0	10.5	17	13.4	63	7.6	4	0.0	0	7.4	7	11.7	91
	Kenai	0.0	0	80.1	2	71.2	115	40.3	189	56.0	30	0.0	0	79.9	74	52.6	410
	Kasilof	0.0	0	0.0	0	18.3	30	46.3	218	36.4	20	0.0	0	12.7	12	35.7	279
	Total	0.0	0	100.0	2	100.0	162	100.0	470	100.0	54	0.0	0	100.0	92	100.0	780

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Date	System	Age Class[a,b]															
		0.2		0.3		1.2		1.3		2.2		1.4		2.3		Total	
		%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
7/11	Susitna	0.0	0	11.4	0	5.7	8	7.1	24	4.0	2	0.0	0	4.0	1	7.9	36
	Kenai	0.0	0	88.6	1	73.6	99	41.1	91	56.1	33	0.0	0	81.8	30	56.2	254
	Kasilof	0.0	0	0.0	0	20.7	28	51.8	114	39.9	24	0.0	0	14.2	5	37.8	171
	Total	0.0	0	100.0	1	100.0	135	100.0	221	100.0	59	0.0	0	100.0	37	101.8	453
7/14	Susitna	0.0	0	19.9	3	6.3	12	17.7	167	5.8	5	0.0	0	7.4	12	14.2	199
	Kenai	0.0	0	80.1	10	42.5	79	52.8	498	42.2	38	0.0	0	79.8	131	54.0	756
	Kasilof	0.0	0	0.0	0	51.2	95	29.5	278	52.0	47	0.0	0	12.8	21	31.5	441
	Unknown	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.4	4
	Total	0.0	0	100.0	13	100.0	185	100.0	943	100.0	90	0.0	0	100.0	164	99.7	1,399
7/18	Susitna	0.0	0	23.5	19	5.2	49	16.5	579	4.7	24	0.0	0	8.1	86	12.4	757
	Kenai	0.0	0	76.5	60	28.5	270	39.9	1,401	28.1	144	0.0	0	70.1	741	42.8	2,617
	Kasilof	0.0	0	0.0	0	66.3	628	43.6	1,531	67.2	345	0.0	0	21.8	230	44.8	2,734
	Total	0.0	0	100.0	79	100.0	947	100.0	3,512	100.0	513	0.0	0	100.0	1,057	100.0	6,108

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		Age Class[a,b]															
		0.2		0.3		1.2		1.3		2.2		1.4		2.3		Total	
Date	System	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
7/21	Susitna	0.0	0	24.3	18	5.8	49	20.3	641	5.7	19	0.0	0	8.3	48	15.5	775
	Kenai	0.0	0	75.7	57	30.4	255	46.9	1,480	32.2	109	0.0	0	69.1	397	46.0	2,298
	Kasilof	0.0	0	0.0	0	63.8	535	32.8	1,035	62.1	211	0.0	0	22.6	130	38.3	1,911
	Unknown	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.9	10
	Total	0.0	0	100.0	75	100.0	839	100.0	3,156	100.0	340	0.0	0	100.0	574	99.8	4,994
7/25	Susitna	0.0	0	25.5	15	22.9	134	28.0	814	11.1	45	0.0	0	10.6	107	22.3	1,115
	Kenai	0.0	0	74.5	45	49.7	291	60.8	1,767	58.9	239	0.0	0	82.3	832	63.4	3,173
	Kasilof	0.0	0	0.0	0	27.4	160	11.2	326	30.0	122	0.0	0	7.1	72	13.6	679
	Total	0.0	0	100.0	60	100.0	585	100.0	2,907	100.0	405	0.0	0	100.0	1,011	100.0	5,004
7/26	Susitna	0.0	0	25.5	8	22.9	66	28.0	402	11.1	22	0.0	0	10.6	53	22.3	551
	Kenai	0.0	0	74.5	22	49.7	144	60.8	873	58.9	118	0.0	0	82.3	411	63.4	1,568
	Kasilof	0.0	0	0.0	0	27.4	79	11.2	161	30.0	60	0.0	0	7.1	35	13.6	335
	Total	0.0	0	100.0	30	100.0	289	100.0	1,436	100.0	200	0.0	0	100.0	499	100.0	2,471

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		Age Class[a,b]														
		0.2		0.3		1.2		1.3		2.2		1.4		2.3		Total	
Date	System	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
7/28	Susitna	0.0	0	33.0	49	17.6	91	37.1	787	16.7	33	0.0	0	14.9	115	28.4	1,074
	Kenai	0.0	0	67.0	99	59.9	308	55.9	1,185	61.9	122	0.0	0	80.4	621	61.7	2,335
	Kasilof	0.0	0	0.0	0	22.5	116	7.0	148	21.4	42	0.0	0	4.7	36	9.1	343
	Total	0.0	0	100.0	148	100.0	515	100.0	2,120	100.0	197	0.0	0	100.0	772	100.0	3,786
7/30	Susitna	0.0	0	16.7	5	8.4	28	19.7	386	8.0	16	0.0	0	6.7	38	15.3	473
	Kenai	0.0	0	83.3	26	70.7	238	73.1	1,432	72.3	145	0.0	0	89.2	502	75.7	2,344
	Kasilof	0.0	0	0.0	0	20.9	70	7.2	141	19.7	40	0.0	0	4.1	23	8.9	274
	Total	0.0	0	100.0	31	100.0	337	100.0	1,959	100.0	201	0.0	0	100.0	563	100.0	3,095
7/31	Susitna	0.0	0	23.2	55	11.1	287	19.7	2,957	10.5	162	0.0	0	35.0	1,511	21.0	4,972
thru	Kenai	0.0	0	76.8	182	61.4	1,588	73.1	10,974	63.4	977	0.0	0	60.7	2,620	68.9	16,340
9/08	Kasilof	0.0	0	0.0	0	27.5	711	7.2	1,081	26.1	402	0.0	0	4.3	186	10.0	2,380
	Total	0.0	0	100.0	237	100.0	2,586	100.0	15,012	100.0	1,541	0.0	0	100.0	4,316	100.0	23,722

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| Date | System | Age Class[a,b] | | | | | | | | | | | | | | | |
| | | 0.2 | | 0.3 | | 1.2 | | 1.3 | | 2.2 | | 1.4 | | 2.3 | | Total | |
		%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
Total	Susitna	0.0	0	26.6	205	10.0	777	20.6	7,728	9.6	446	0.0	0	21.0	2,095	18.5	11,251
	Kenai	0.0	0	73.4	565	56.0	4,378	55.8	20,965	48.8	2,273	0.0	0	68.9	6,874	57.5	35,055
	Kasilof	0.0	0	0.0	0	34.0	2,658	23.6	8,864	41.6	1,938	0.0	0	10.1	1,011	23.8	14,471
	Unknown	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.2	147
	Total	0.0	0	100.0	770	100.0	7,813	100.0	37,557	100.0	4,657	0.0	0	100.0	9,980	100.0	60,924

[a] Age class totals may differ slightly from original age class totals due to rounding error.
[b] The values shown in this table include estimated and imputed quantities.

Appendix B.4. Stock composition of sockeye salmon commercial catches by age class and date for the Salamatof Beach set gill net fishery, Upper Cook Inlet, 1986.

| | | Age Class[a,b] | | | | | | | | | | | | | | |
| | | 0.2 | | 0.3 | | 1.2 | | 1.3 | | 2.2 | | 1.4 | | 2.3 | | Total | |
Date	System	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
7/4	Susitna	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
thru	Kenai	100.0	323	100.0	3,724	100.0	21,045	100.0	89,041	100.0	11,981	100.0	809	100.0	34,970	100.0	161,893
7/27	Kasilof	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	Total	100.0	323	100.0	3,724	100.0	21,045	100.0	89,041	100.0	11,981	100.0	809	100.0	34,970	100.0	161,893
7/28	Susitna	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
thru	Kenai	0.0	0	100.0	190	95.0	16,701	94.8	46,214	.93.5	8,084	100.0	286	97.5	19,085	95.3	90,560
8/15	Kasilof	0.0	0	0.0	0	5.0	879	5.2	2,535	6.5	562	0.0	0	2.5	489	4.7	4,465
	Total	0.0	0	100.0	190	100.0	17,580	100.0	48,749	100.0	8,646	100.0	286	100.0	19,574	100.0	95,025
Total	Susitna	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	Kenai	100.0	323	100.0	3,914	95.0	37,746	94.8	135,255	93.5	20,065	100.0	1,095	97.5	54,055	98.3	252,453
	Kasilof	0.0	0	0.0	0	5.0	879	5.2	2,535	6.5	562	0.0	0	2.5	489	1.7	4,465
	Total	100.0	323	100.0	3,914	100.0	38,625	100.0	137,790	100.0	20,627	100.0	1,095	100.0	54,544	100.0	256,918

[a] Age class totals may differ slightly from original age class totals due to rounding error.
[b] The values shown in this table include estimated and imputed quantities.

Appendix B.5. Stock composition of sockeye salmon commercial catches by age class and date for the Kalifonsky Beach set gill net fishery, Upper Cook Inlet, 1986.

Age Class[a,b]

Date	System	0.2 %	0.2 Number	0.3 %	0.3 Number	1.2 %	1.2 Number	1.3 %	1.3 Number	2.2 %	2.2 Number	1.4 %	1.4 Number	2.3 %	2.3 Number	2.4 %	2.4 Number	Total %	Total Number
7/03	Susitna	0.0	0	0.0	0	29.7	639	30.6	1,068	20.5	159	11.5	3	23.4	74	0.0	0	28.7	1,943
thru	Kenai	0.0	0	0.0	0	46.6	1,002	21.2	740	34.8	271	42.6	12	58.3	185	0.0	0	32.7	2,209
7/07	Kasilof	0.0	0	0.0	0	23.7	510	48.2	1,682	44.7	348	45.9	12	18.3	58	0.0	0	38.6	2,610
	Total	0.0	0	0.0	0	100.0	2,150	100.0	3,490	100.0	778	100.0	27	100.0	317	0.0	0	100.0	6,762
7/11	Susitna	79.3	100	0.0	0	7.3	2,054	20.5	3,091	6.7	913	5.0	50	9.0	431	0.0	0	10.5	6,639
thru	Kenai	20.7	26	0.0	0	39.3	11,057	48.7	7,342	39.0	5,314	64.7	653	77.0	3,691	76.8	242	44.9	28,325
7/14	Kasilof	0.0	0	0.0	0	53.4	15,024	30.8	4,643	54.3	7,398	30.3	306	14.0	671	23.2	73	44.6	28,115
	Total	100.0	126	0.0	0	100.0	28,134	100.0	15,076	100.0	13,625	100.0	1,009	100.0	4,794	100.0	315	100.0	63,079
7/15	Susitna	0.0	0	15.2	73	6.0	5,507	15.6	14,129	5.5	1,714	0.0	0	5.8	1,597	0.0	0	9.5	23,019
thru	Kenai	0.0	0	84.8	410	56.3	51,670	64.4	58,326	56.1	17,478	0.0	0	86.5	23,816	0.0	0	62.8	151,699
7/22	Kasilof	0.0	0	0.0	0	37.7	34,600	20.0	18,114	38.4	11,964	0.0	0	7.7	2,120	0.0	0	27.7	66,797
	Total	0.0	0	100.0	483	100.0	91,776	100.0	90,568	100.0	31,155	0.0	0	100.0	27,533	0.0	0	100.0	241,515

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		Age Class[a,b]																	
		0.2		0.3		1.2		1.3		2.2		1.4		2.3		2.4		Total	
Date	System	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
7/25 thru 8/15	Susitna	0.0	0	6.6	72	1.9	1,413	6.4	3,574	1.8	503	1.7	9	2.2	475	0.0	0	3.3	6,045
	Kenai	0.0	0	93.4	1,016	45.2	33,604	67.4	37,643	47.4	13,236	98.3	535	82.7	17,845	0.0	0	57.3	103,879
	Kasilof	0.0	0	0.0	0	52.9	39,329	26.2	14,633	50.8	14,186	0.0	0	15.1	3,258	0.0	0	39.4	71,405
	Total	0.0	0	100.0	1,088	100.0	74,345	100.0	55,850	100.0	27,925	100.0	544	100.0	21,578	0.0	0	100.0	181,330
Total	Susitna	79.3	100	9.2	145	4.9	9,611	13.3	21,862	4.5	3,289	4.0	63	4.8	2,577	0.0	0	7.6	37,647
	Kenai	20.7	26	90.8	1,426	49.6	97,332	63.1	104,051	49.4	36,299	75.9	1,199	84.0	45,537	23.2	73	58.1	286,112
	Kasilof	0.0	0	0.0	0	45.5	89,461	23.7	39,072	46.1	33,896	20.1	318	11.3	6,107	76.8	242	58.1	286,112
	Total	100.0	126	100.0	1,571	100.0	196,405	100.0	164,985	100.0	73,483	100.0	1,580	100.0	54,222	100.0	315	100.0	492,687

[a] Age class totals may differ slightly from original age class totals due to rounding error.
[b] The values shown in this table include estimated and imputed quantities.

Appendix B.6. Stock composition of sockeye salmon commercial catches by age class and date for the Cohoe/
Ninilchik Beach set gill net fishery, Upper Cook Inlet, 1986.

| | | Age Class[a,b] | | | | | | | | | | | | | | |
| | | 0.3 | | 1.2 | | 1.3 | | 2.2 | | 1.4 | | 2.3 | | Other[c] | | Total | |
Date	System	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
7/03	Susitna	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
thru	Kenai	100.0	62	36.3	3,102	11.3	1,893	18.4	769	2.3	1	48.0	673	100.0	186	21.4	6,687
7/04	Kasilof	0.0	0	63.7	5,444	88.7	14,855	81.6	3,411	97.7	61	52.0	730	0.0	0	78.6	24,500
	Total	100.0	62	100.0	8,546	100.0	16,748	100.0	4,180	100.0	62	100.0	1,403	100.0	186	100.0	31,187
7/07	Susitna	13.8	62	5.7	2,612	5.7	2,128	3.5	665	1.8	36	4.2	272	0.0	0	5.2	5,775
thru	Kenai	86.2	385	59.8	27,405	26.4	9,856	39.3	7,467	44.2	889	70.7	4,583	100.0	672	45.9	51,259
7/13	Kasilof	0.0	0	34.5	15,811	67.9	25,349	57.2	10,869	54.0	1,086	25.1	1,627	0.0	0	49.0	54,742
	Total	100.0	447	100.0	45,828	100.0	37,333	100.0	19,001	100.0	2,012	100.0	6,483	100.0	672	100.0	111,776
7/14	Susitna	29.3	117	19.8	11,797	22.9	8,975	7.1	1,476	5.9	189	11.0	1,070	0.0	0	17.7	23,625
thru	Kenai	70.7	283	80.2	47,786	41.0	16,068	31.6	6,571	57.0	1,823	71.0	6,909	17.8	71	59.6	79,511
7/15	Kasilof	0.0	0	0.0	0	36.1	14,148	61.3	12,747	37.1	1,187	18.0	1,752	82.2	329	22.6	30,162
	Total	100.0	400	100.0	59,583	100.0	39,190	100.0	20,795	100.0	3,199	100.0	9,731	100.0	400	100.0	133,298

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		Age Class[a,b]														
		0.3		1.2		1.3		2.2		1.4		2.3		Other[c]		Total	
Date	System	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
7/17	Susitna	45.7	356	18.1	18,588	41.6	35,151	16.7	7,511	12.8	67	21.3	5,649	0.0	0	25.9	67,322
thru	Kenai	54.3	424	35.9	36,868	36.6	30,926	36.0	16,192	60.5	315	67.2	17,821	0.0	0	39.4	102,546
7/20	Kasilof	0.0	0	46.0	47,241	21.8	18,421	47.3	21,275	26.7	139	11.5	3,050	0.0	0	34.7	90,125
	Total	100.0	780	100.0	102,697	100.0	84,498	100.0	44,979	100.0	520	100.0	26,519	0.0	0	100.0	259,993
7/21	Susitna	40.0	69	6.0	1,433	24.8	3,595	6.0	773	0.0	0	12.1	693	20.9	24	11.5	6,588
	Kenai	60.0	103	15.2	3,631	27.6	4,001	16.3	2,101	0.0	0	48.6	2,784	27.2	31	22.1	12,652
	Kasilof	0.0	0	78.8	18,826	47.6	6,900	77.7	10,016	0.0	0	39.3	2,251	51.9	60	66.4	38,053
	Total	100.0	172	100.0	23,891	100.0	14,495	100.0	12,891	0.0	0	100.0	5,729	100.0	115	100.0	57,293
7/22	Susitna	25.0	417	5.6	7,847	20.2	21,431	5.5	2,899	7.7	51	8.4	2,606	0.0	0	10.6	35,253
thru	Kenai	75.0	1,251	28.4	39,796	45.0	47,743	30.2	15,920	92.3	616	67.2	20,851	100.0	1,335	38.2	127,512
8/15	Kasilof	0.0	0	66.0	92,484	34.8	36,921	64.3	33,896	0.0	0	24.4	7,571	0.0	0	51.2	170,872
	Total	100.0	1,668	100.0	140,127	100.0	106,096	100.0	52,715	100.0	667	100.0	31,028	100.0	1,335	100.0	333,636

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		Age Class[a,b]														
		0.3		1.2		1.3		2.2		1.4		2.3		Other[c]		Total	
Date	System	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
Total	Susitna	28.9	1,021	11.1	42,278	23.9	71,280	8.6	13,326	5.3	343	12.7	10,291	0.9	24	14.9	138,563
	Kenai	71.1	2,508	41.7	158,589	37.0	110,486	31.7	49,021	56.4	3,644	66.3	53,622	84.8	2,295	41.0	380,166
	Kasilof	0.0	0	47.2	179,805	39.1	116,594	59.7	92,214	38.3	2,473	21.0	16,980	14.3	388	44.1	408,454
	Total	100.0	3,529	100.0	380,672	100.0	298,360	100.0	154,561	100.0	6,460	100.0	80,893	100.0	2,708	100.0	927,183

[a] Age class totals may differ from original age class totals due to rounding error.
[b] The values shown in this table include estimated and imputed quantities.
[c] Age classes 0.2, 2.1, 0.4, 3.2, and 2.4 are represented in "other" category.